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Cover

A CH-149 Cormorant operated by Canada's 442 Transport and Rescue Squadron. Since entering service with the RCAF in 2002, the Cormorant has proven itself to be a capable SAR helicopter.

MIKE REYNO PHOTO

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COLUMN

FOCUS ON PROFESSIONALISM | **TONY KERN**

PREPARING FOR THE UNEXPECTED

Emergency responders face an interesting dilemma. On the one hand, the environment is fraught with a never-ending flow of new circumstances and challenges. On the other, it is often tremendously risk-laden and demands careful planning. But how can you plan for factors and challenges you don't yet know? How can you plan for the unexpected?

The first critical element is to arrive every day (or night) with your "A game" intact. Physiologically ready, proficient in your vocational tasks, and with a relaxed vigilance that sets the stage for great situational awareness.

Next, you need to give planning serious conscious thought and realize there are many reasons we tend to resist it. Thorough planning is one of the most recognizable traits of a high achiever. Planning is seldom fun or glamorous. It occurs behind the scenes. There are many reasons people give for not planning: *not enough time, don't really need it, won't work for me, it's too constraining, my work is too unpredictable, I'm a creative type, etc.* These are merely excuses.

The real reason people don't plan is usually one of the following:

- *They don't understand the value.* If you have never been shown how to plan properly, you don't understand how important it can be. You meet the challenges of the day-to-day mission profiles, so you assume you don't need to plan — until the day you do.
- *No time specifically allocated to do it in depth.* Planning takes time, and if you are always waiting for all the variables to fall into place, that time never arrives. There is a way around this, which we will get to in a moment.
- *They don't know how to do it in depth.* Planning is a skill that is learned; there are good ways to do it, and there are bad ways to do it. Learn how to do it right and make it a permanent skill, not only for your emergency response mission, but for life in general.

A method for planning for the unknown has been developed both in the military and the business world and has been used for decades. It's called by different names, but for our purposes we will call it "scenario-based planning." Here's one way to get started.

First, define the planning issue you want to address. For our purposes, let's say it is environmental factors such as weather, or remote or densely packed urban locations that require a fast response time. What are the variables? Weather, traffic, landing zones come to mind quickly. But deeper analysis might reveal a few more. For example, how can you — in advance of needing to do so — get real-time information on what these variables are at multiple locations? Can you make a list of potential sources (local law enforcement, webcams, other agencies, etc.)? Can you develop communications protocols for fast response when you need it?

Next, make a list of what you already know. For example, the weather minimums you can operate in. The capability of your technology. The proficiency — or lack thereof — of your team.

Third, identify what you don't know, and can't know in the present. Where will the call come from? What remote possibilities exist? Think mass casualty events, communications failures, hostile actors at the call location, and worst-case scenarios.

Use this list to construct multiple hypothetical scenarios. Brainstorm how you would handle each unknown with the perspective that the situation will deteriorate as it unfolds. Think through each scenario, and develop contingency plans for how you respond.

Finally, target the most likely scenarios first. For example, if you operate in an area with a large river basin, target scenarios that include flooding, accompanied by all of the things that might come along with it. If you are in tornado alley, think through all the items you could confront from a Category Five ripping through your area.

Lack of adequate planning time or depth results in "free styling" during execution, and that's when the unexpected bites hardest. Preparing for the unexpected can be done in a sit-down session as outlined above, but can also be accomplished during routine operational debriefs. After each mission success, think of one or two things that could have changed the outcome for the worse, and talk about how you would have handled it.

True pros know that the worst-case scenario is always just around the corner, and they are ready for it when it arrives.

How can you plan for factors and challenges you don't yet know? How can you plan for the unexpected?

RADALT? HTAWS? ADS-B? CHECK. CHECK. AND CHECK.

To help make flying safer for all of us, the FAA has enacted new rules requiring radar altimeters for all Part 135 commercial helicopter operators – as well as HTAWS terrain alerting for air ambulance operators. Also, most aircraft flying in U.S. controlled airspace will need ADS-B “Out” capability by year end of 2019. For the best in compliance solutions, Garmin is your go-to source. But don’t wait. Dealer installation schedules are filling up fast. To learn more, visit Garmin.com/helicopters

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HAA CORNER | **BILL WINN**

MICRO-MENTORING: ANOTHER SPIN ON AMRM?

It's becoming a little tedious, isn't it? It seems like we can't attend a monthly staff meeting, or a shift-change briefing, or a new-hire orientation class, or open the cover of *Vertical 911* Magazine without being inundated with jargon related to crew resource management (CRM), air medical resource management (AMRM), workload fatigue and stress management, effective communication skills, assertiveness, safety culture, feedback techniques, human factors mitigation, and perhaps above all: conflict resolution. And the list goes on…

The fact is that the scope of factors that can affect the safety of air medical transport operations is very broad. Understanding and mitigating just the human factors alone is worthy of at least a one-semester college course. Add in the organizational, cultural, technical, and infrastructural elements of safety management and we have the gist for a complete degree program.

And we expect every helicopter air ambulance (HAA) pilot and medical crewmember to understand and properly apply all of these concepts.

This past week, I read a cogent overview of AMRM in a recent book by author and expert AMRM train-the-trainer instructor, Randy Mains. Randy is betting that there are no "dummies" assigned as helicopter air ambulance pilots or crewmembers, so he titled his book *Air Medical Resource Management for the Totally Brilliant*. The book presents the essential elements of AMRM and strongly advocates for a facilitative mode of AMRM instruction that draws the learners into a personally interactive experience that has them practicing and discussing AMRM techniques in simulated scenarios, instead of just hearing a series of lectures about the principles involved.

My intent here is to advocate for what I consider another very effective method for reinforcing and polishing the skills and practices that make up air medical resource management. I'll call it "micro-mentoring."

Once the concepts of AMRM have been presented in formal training sessions, micro-mentoring can take place during any actual patient transport flight. I believe that all HAA pilots should be designated micro-mentors, along with selected medical crewmembers. And I'll add that medical micro-mentors can be designated as such by their managers, or they can assume that role of their own volition.

Virtually every flight will include specific verbal exchanges or other interactions between crewmembers that fall under the scope of air medical resource management. Micro-mentoring is taking just a few seconds to acknowledge, and perhaps critique, the performance of selected incidences of AMRM that occur during a flight. This is especially helpful for new air medical crewmembers who need to see and understand the connection between what they heard in the classroom and what is practiced in the aircraft. Micro-mentoring can also include specifically contrived situations.

Micro-mentoring is taking just a few seconds to acknowledge, and perhaps critique, the performance of selected incidences of AMRM that occur during a flight.

As an example, imagine that the helicopter and crew have just landed in an unimproved landing zone (LZ) in a clearing near a forest campground. It's a public relations flight and the crew is teaching a quick lesson in LZ safety to a group of emergency first responders from the local area. While the crew is speaking with the group nearby, the pilot carefully observes the area immediately surrounding the aircraft and notes some potential obstacles that are three or four feet in height. After the crew has finished the PR activity and the aircraft is ready for lift-off, the pilot lifts to a 10-foot hover and performs a 90-degree right hovering turn prior to takeoff.

As the pilot begins the hovering turn without any comment, if either of the crew members in the back of the aircraft were to quickly confirm, "Your tail is clear to the left, but maintain your height 'cause there's a four-foot tree stump back there," the pilot would respond, "Thank you, I forgot to ask you to clear the tail. That was good AmRam, Jane." That's micro-mentoring.

If neither crewmember says anything during the hovering turn, the pilot will quietly proceed with the takeoff. After clearing all obstacles during the climb-out the pilot will then say, "What did I do wrong back there just before takeoff?" Whether one of the crewmembers is able to point out the failure to ensure that the tail was clear prior to the hovering turn, or whether the pilot has to point it out himself, the brief discussion will emphasize the importance of ensuring and communicating that the tail is clear prior to performing a hovering turn in any "primitive" LZ. That's micro-mentoring, too.

You can easily think of many other effective ways that your own organization can use this approach to teach and to reinforce the concepts of AMRM.

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COLUMN

FOCUS ON SAFETY | **DAN FOULDS**

SITUATIONAL AWARENESS

In air medical resource management, it's essential to sound the alarm when something doesn't seem right. But sometimes it's hard to know when to speak up.

Years ago, a flight nurse friend of mine was a member of a crew who flew a patient from Atlanta, Georgia, to Greenville, South Carolina. They dropped off their patient, went to the Greenville Airport for fuel and cookies and lemonade, and headed out to the aircraft for the flight home.

It was a pretty day, and spirits were high. As they rode along, one of the two crewmembers in the cabin remarked, "Hey, the key isn't on the hook!" The key being referred to was the key for the fuel cap. It would normally be used during refueling, then put back in place after fueling was complete and the cap was secured.

The pilot became quiet. He wasn't saying much, but his brain was twirling. "Did I leave the fuel cap off? Is it lying on the asphalt back at the airport? Will we get back without a fuel cap? Will I get in trouble? Will I get fired?"

Without saying anything about all this, he announced, "Guys, there is a big field in front of us. I am going to land and check the fuel cap."

Now, when I am presenting this case in my air medical resource management (AMRM) classes, this is where I say something like, "You people who have been flying for a while know that there is a normal sequence of events to a flight and a landing. When we are preparing to land, we do an orbit at altitude. We verbalize the high recon, the before-landing check, and announce where we think the winds are from. We talk about obstacles on the way in during the low recon."

I ask the people in the room to be aware of what is happening on approaches and to call for a go-around if things seem out of order. "Hey," I tell them, "you are smart people! Don't let me crash you because I am distracted or upset!"

That fine day in South Carolina, a good and experienced pilot fell prey to human factors and flew that perfectly good helicopter straight into that field, too fast, and destroyed it. Luckily, no one was killed.

Of course, I would never do something like that. Nor would I let another pilot do that to me. Right?

Having discussed this event maybe 100 times over the last five or six years, you would think I would know enough to speak up if someone was about to crash with me on board. But it can be harder than I imagined to know what to say and when to say it.

I learned this recently while working as a mate on a tour boat in coastal Georgia — a part-time job I picked up after retiring from my career as a helicopter emergency medical services (HEMS) pilot. Working on the boat part-time is pure pleasure. No one is hurt or sick, and people are there to have fun. I make beer money and meet people from all over. And I learn lessons. Still.

A couple of months ago, we were taking a group of tourists back to the Landings Harbor Marina. This marina is enclosed with a metal seawall, and tight. It's hard to maneuver our 45-foot-long boat in the enclosure, and Captain Buddy does this task himself.

I should mention here that docking a boat is different than landing a helicopter. The tried-and-true technique for landing is to approach slowly, carefully, cautiously. But boat captains will occasionally be forced by wind and current to make a fast approach, then use bursts of power to arrest forward motion and swing the stern towards the dock.

When I first saw Buddy doing this it made me nervous, and glad that it wasn't me doing it. But I had watched him do it for several months, and I never saw him make a mistake. Every time, he would use skill and power to put the boat right up to the dock. So on that evening in the tight little docking basin, as I stood on the front platform and watched us rapidly approach the dock, I wasn't worried. Buddy is a great and experienced Captain, and he is my teacher.

Closer. Still fast.

I looked back down the length of the boat. He was looking intently at where we were headed — toward a fuel dock at a 45-degree angle. We had seven or eight knots of speed through the water, on a big heavy boat. I looked back to the front.

Really close now.

We weren't going to stop! As we slammed our bow into the dock I stepped off of the bow platform. Buddy yelled, "DAN! Why didn't you say something?"

We unloaded our slightly ruffled passengers, and did a debrief right there. And I explained why I didn't speak up. I thought of the helicopter that was destroyed by a distracted pilot. I realized then that it's not always easy to do what I asked of the crewmembers in my classes — to monitor the pilot's actions and speak up if something seems wrong. For one thing, maybe you won't know exactly when the pilot is making a mistake.

So how will we learn about this? How are we going to know what is OK and what isn't? How are we going to know what to say, and when to say it?

The answer is going to be education, and communication, and consideration. Humility and respect will help, as will honest discussions of past mistakes. After all, we can learn from other people's mistakes — or we can repeat them ourselves.

Don't Compromise.

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Members of Bristow's new search-and-rescue consortium in the Gulf of Mexico have access to a Leonardo AW139, and a Sikorsky S-76C++ and S-92. **Bristow Photos**

Bristow launches SAR consortium

BY JEN BOYER

Bristow U.S., LLC officially launched a new search-and-rescue (SAR) consortium in the Gulf of Mexico earlier this year with the award of a deep-water medevac and SAR service contract with Shell Offshore, Inc.

In the works since Bristow took over CHI Aviation's SAR base in Galliano, Louisiana, in mid-2016, the Bristow SAR consortium was created to provide advanced SAR and critical care lifesaving services to its members in a model designed to reduce members' overall SAR costs compared to solely using ad hoc services.

"Bristow has a long history of providing SAR capabilities around the world, with more than 65,000 SAR hours flown," said Bristow Americas regional director Samantha Willenbacher. "We want to provide this same advanced level of SAR service and medical care to the people in and around the Gulf that no one else is able to provide."

Based out Bristow's dedicated SAR facility at the South Lafourche Airport in Galliano, the consortium operates three different types of helicopters, available 24/7 for its members. For smaller rigs and emergency medical services (EMS) transport missions, a dedicated instrument flight rules (IFR), critical care-equipped Sikorsky S-76 C++ is available. The dual-pilot S-76 is equipped with an auxiliary fuel tank allowing extended range and the capability to support smaller platforms with limited helidecks in the Gulf of Mexico.

In addition, members have access to a Sikorsky S-92 and a Leonardo AW139. The S-92 is dual-pilot, configured for critical care transport and rescue operations with an onboard hoist operator, rescue specialist (certified rescue swimmer), and critical care transport-flight paramedic, all specifically trained for point-of-injury industrial confined space and technical rescue. The SAR aircraft itself is equipped with advanced avionics, forward-looking infrared (FLIR) camera, searchlight, auto hover, dual rescue hoists, wireless ICS, and onboard advanced medical equipment.

Bristow rescue operations manager for the Americas David Jacob emphasized that the S-92 is the only all-weather heavy SAR aircraft operating in the Gulf of Mexico. Its speed and extended operational range allow it to

reach ultra deep-water rigs and installations while its capacity gives it the advantage in supporting mass casualty situations.

"We see it as our duty to care not only for our customers in the offshore industrial environment, but also to support any aviation incident or emergency situation in the Gulf," Jacob said. "Operators will no longer have to rely solely on the Coast Guard for supporting their offshore operation.

"Our very experienced flight crews, supported with multiple long-range aircraft, critical care medical capability, and contingency rescue equipment, truly provide us an unmatched ability to support any maritime emergency situation. Since the establishment of our SAR operation, we have provided mutual assistance to the Coast Guard in responding to emergencies for other offshore commercial activities and maritime operations."

Jacob noted that Bristow's highly skilled and trained medical teams allow the consortium to provide a higher level of medical support than was previously offered in the Gulf. "This expertise, paired with our extended range capability, allows us to bypass the closest hospital and deliver the patient directly to the most definitive care facility further inland, saving valuable time. Our flight medics can obtain 12-lead EKGs and activate regional STEMI alerts, allowing us to bypass the emergency room and shorten the 'door-to-balloon' time for percutaneous coronary intervention."

Shell and Hess Corporation currently make up the consortium. Jacob said he is confident this is only the beginning, noting that quarterly reviews of operations will determine base expansion needs.

Consortium membership is available as a single or multi-year contract for comprehensive SAR services including aeromedical evacuation, hoist rescues, on-site technical rescues, mass casualty support, and emergency cargo runs, Jacob said. Membership includes guaranteed 24/7 coverage, which Bristow backs with its full fleet of aircraft to assure the right asset is available for the job.

The consortium is also unique in its dispatch system, Willenbacher emphasized. The dispatch service employs a medical priority dispatch system where all emergency dispatchers are nationally registered and certified emergency medical technicians. The dispatchers use a medical priority dispatch system to triage calls and identify appropriate medical and aviation assets. When multiple, simultaneous call-outs are received, the order of response is handled according to the situation, location, and acuity.

The dispatchers also provide pre-arrival medical instructions over the phone to the caller until the helicopter arrives, and any critical or pertinent changes in the patient's condition are immediately relayed "real-time" to the en route helicopter.

Prior to the announcement of the consortium, Bristow provided ad hoc services to the region to build support and awareness, including answering the call to assist in evacuations during the floods in Livingston Parish, Louisiana, last summer.

Bristow expects the SAR consortium to grow in popularity, and will conduct quarterly reviews of operations to determine base expansion needs.

ROTOR BITS

COBHAM HELICOPTER ACADEMY TAKES OFF

Cobham has launched a new helicopter academy to make its training expertise available to a broader spectrum of potential customers around the world.

Through the U.K.-based Cobham Helicopter Academy, the company is offering specialized mission training for pilots and rear crew in rescue, military and emergency service operations, in addition to general civil flight training.

"Cobham has been providing ab initio training, specialist flight training and engineer and support training to helicopter pilots, crew and engineers since 1997," said Duncan Milne, vice president, Cobham Helicopter Services.

"Our instructors are among the best in the world — they are all British ex-military, with considerable operational experience gained from the same demanding conditions that students may one day find themselves operating in.

"So whether they're effecting a rescue in an urban conflict zone, or delivering essential maintenance equipment and crew to a remote wind turbine site, our training makes sure they have the outstanding airmanship, captaincy, judgment and risk analysis they need to get the job done — professionally and safely," Milne said.

As a European Aviation Safety Agency (EASA) approved engineering training organization, Cobham also provides training for aircraft engineers and technical support staff using modern teaching and training methods. This includes ab initio, type and on-the-job training, including helicopter familiarization, part 147 type A and B, for Airbus AS350 and AS365, Leonardo A109 and AW139, and Bell 212 and 412 helicopters.

Going vertical with EVS

BY HILARY ROMIG

Many search-and-rescue (SAR) helicopter operators already appreciate the enhanced safety that a forward-mounted enhanced vision system (EVS) can provide to their operations. Now, one EVS manufacturer is also touting the value of this infrared sensor technology in vertically mounted installations.

According to Lexavia director of business development Bob Yerex, a vertically mounted EVS can help SAR and other special mission helicopter operators improve the safety and efficiency of their vertical reference operations by giving pilots a visual image of the area below the helicopter that can be difficult to see, particularly at night or in other low-visibility conditions.

"The sensor is used during the vertical reference phase of the operations, such as hoisting, fast roping or external load operations," Yerex explained. Since the EVS sensor can "see through" atmospheric conditions such as blowing snow, fog and water spray that occur at normal vertical reference ranges, it can give pilots the positional cues that can help facilitate safer and more accurate hovering.

Yerex pointed out that EVS sensors in such operations should be used for situational awareness only. "Flight crews should not use them as their only source of reference to navigate or hover; they are an additional tool to be used in conjunction with other instruments," he said. "Ideally, the ability to detect drift movement or orientation on hazards or a specific spot well beneath the aircraft can speed up the process and improve the efficiency and safety of the overall evolution."

For custom vertically mounted installations, Lexavia is promoting its low-cost LFX2010 infrared sensor, which incorporates the latest high-resolution 640 x 512 long-wave infrared (LWIR) technology. The LFX2010 has 2X digital zoom and polarity (white hot/black hot) capabilities, and can interface with the latest flat panel display systems or be installed as a standalone system. Recording of the vertical sensor imagery provides "a viable SMS [safety management system] documentation tool for inclusion in after-action debriefing," Yerex added.

Lexavia is promoting its LFX2010 solution for vertical installations.

A vertically mounted EVS can provide pilots engaged in hoisting operations with an infrared image of the area below the helicopter, even at night and in bad weather. **Lexavia Images**

Lexavia has been offering vertically mounted LFX2010 solutions to a variety of military, government and civilian helicopter operators. Lexavia's certification team can either facilitate or coordinate with a flight organization to help them complete the necessary installation certifications for a vertical or horizontally mounted EVS. Yerex noted that EVS also works well in conjunction with night vision goggles, with the systems combining to improve situational awareness even in demanding operational scenarios.

As a former U.S. Coast Guard pilot with real-world SAR experience, Yerex is a firm believer in the life-saving potential of EVS — both in traditional forward-mounted installations and now in vertically mounted applications.

"I cannot count the number of times where unseen rogue waves became a very real hazard to the point of near loss of an aircraft, simply because we could not see them until they came within the radius of our search light," Yerex recalled. "In the additional hundreds of times hoisting over vessels with significant vertical obstructions… a simple visual orientation of what we were dealing with and where our rescue devices or swimmer were in orientation to those hazards would have been invaluable."

Airbus improves H145 OEI performance

Wiking Helikopter Service is the first operator to take advantage of the Airbus H145's improved OEI performance. **Christoph Meyer Photo**

Airbus has extended the flight envelope of the H145 by enhancing the helicopter's one-engine-inoperative (OEI) power.

The OEI measures the performance of an aircraft with only one engine remaining operative. The light-twin H145 now offers roughly nine percent increased hover performance capability in OEI mode within the two-minute power band, allowing 40 percent more useful load for the operator.

The upgrade was certified by the European Aviation Safety Agency (EASA) in March 2017. The new certification allows safe OEI performance for 2.5 minutes, as the higher 30-second OEI power is taken into account for emergency situations.

The first operator to take advantage of the increase in engine performance is Wiking Helikopter Service GmbH, which put its first H145 into service earlier this year. Wiking is using the H145 for offshore wind farm support, commercial sea pilot transfers, and air rescue missions over the North Sea.

"The additional power reserves of the H145 contribute even more to safety and efficiency of our daily operations over the North Sea in all weather conditions," said Alexander von Plato, managing director of Wiking Helikopter Service.

The H145 in offshore configuration is equipped with a hoist certified for human external cargo (HEC), an emergency flotation system certified for Sea State 6, a helicopter emergency egress lighting system, a weather radar, and an automatic deployable emergency locator transmitter.

Air National Guard unit flies 600 miles offshore for rescue

The 129th Rescue Wing's aerial refueling capabilities allow it to perform long-range overwater rescues that many other helicopter operators can't. **Skip Robinson Photo**

On April 18, the California Air National Guard's 129th Rescue Wing (RQW) flew two Sikorsky HH-60G Pave Hawk helicopters, one MC-130P Combat Shadow aircraft, and one four-person Guardian Angel Pararescue team approximately 600 miles off the California coast to successfully recover an injured patient from a fishing vessel, the Gutsy Lady 4.

Once reaching the Gutsy Lady 4, the Guardian Angel team boarded the vessel and stabilized and secured the patient before hoisting him onto their helicopter. The team then provided care to the patient on board the helicopter until they arrived at San Jose Regional Medical Center that evening.

"This was a high-risk mission . . . mainly based off of the overall distance," said Maj. Nate Nowaski, the mission's search and rescue duty officer. "Commanders weigh that risk based off the patient's overall medical status and urgency and we do our best to mitigate any additional risks to the patient, the fishing vessel crew and our own rescue crews."

One KC-130J aircraft from the Marine Aerial Refueling Transport Squadron 352 (VMGR 352), 3rd Marine Aircraft Wing at Miramar also departed to provide the 129th RQW with additional aerial refueling support. It was the second time this year that the 129th RQW has worked in conjunction with its joint partners on a civilian rescue operation, and marked the unit's 1,016th life saved since 1977.

Air Medical Group Holdings agrees to acquire Air Medical Resource Group

Texas-based air medical operator AMGH will add 62 bases to its portfolio with the acquisition of AMRG. **Med-Trans Photo**

Air Medical Group Holdings, Inc. (AMGH), a leading medical transport and emergency medical service provider, has agreed to acquire Air Medical Resource Group (AMRG) of South Jordan, Utah. AMRG has operations in 15 states, including Alaska and Hawaii.

Lewisville, Texas-based AMGH already has hundreds of critical care aircraft in operation. With the acquisition of AMRG it will add 62 bases and new geographies to its customer service footprint.

"AMGH is delighted to add AMRG's unique and widespread rotor and fixed-wing operations and markets such as Alaska and Hawaii, enabling us to partner to provide medical transport solutions to even more regions of the U.S.," said AMGH CEO Fred Buttrell. "AMRG's president Joseph Hunt and his leadership team have built an enviable record of customer engagement at the local level that will work nicely with existing AMGH operations and we look forward to their service contributions in the future."

"We are joining one of, if not the finest, medical transport organizations in America, and we very much welcome the opportunity to continue to grow as a significant part of that organization," said Hunt. "Our commitment to AMGH is to continue to successfully meet and exceed patient expectations for providing the ultimate in medical care in a safe environment in their emergent time of need."

AMRG companies include Eagle Air Med serving parts of Arizona, New Mexico, South Dakota, Colorado and Utah; Hawaii Life Flight in Hawaii; Guardian Flight in Alaska, Wyoming and Utah; Gallup Med Flight and MedStar in New Mexico; Aeromed in Puerto Rico; Valley Med Flight in North Dakota, Michigan, Montana, Wisconsin and Minnesota; Alaska Regional LifeFlight in Alaska; MountainStar AirCare operating in parts of Idaho, Wyoming and Utah; AeroCare Medical Transport serving the Navajo Nation in Arizona and the Four Corners region; and Wiregrass Life Flight serving Alabama.

American Securities completes acquisition of Air Methods

Air Methods Corporation, a global leader in air medical transportation and air tourism, and American Securities LLC, a leading U.S. private equity firm, on April 21 announced the closing of American Securities' acquisition of Air Methods.

With its acquisition by American Securities, Air Methods will become a private, rather than publicly traded, company. **Skip Robinson Photo**

Air Methods is the largest domestic air medical transport provider in the $5 billion air medical market, serving 48 states with over 300 bases of operations. The company also operates a leading air tourism business, and employs more than 5,000 people.

"As a private company, Air Methods will have greater flexibility to execute our strategy and pursue long-term growth," said Aaron Todd, chief executive officer. "We look forward to partnering with American Securities to strengthen our market position in air medical transportation and air tourism."

In 2016, Air Methods provided lifesaving care to more than 70,000 patients.

"We have strong admiration for the men and women at Air Methods and their commitment to providing critical access to care for patients and communities served," said Marc Saiontz, a managing director of American Securities. "The Air Methods team has a paramount focus on clinical care and aviation safety, and on providing hospitals and local communities with the highest quality air ambulance services available. We are excited to assist the company in this critical mission."

Air Methods, FlightSafety announce new training facility in Colorado

Air Methods and FlightSafety International have announced the new FlightSafety Learning Center in Denver, Colorado.

In addition, Air Methods and FlightSafety recently welcomed the second of four FlightSafety-built Level-D qualified full motion simulators designated for the training facility located in Colorado. The installation of the new Airbus AS350 B3 Level D simulator took place in February 2017, joining the Airbus EC135 simulator, which was previously used by Air Methods at FlightSafety's Learning Center in Dallas, Texas.

"We're thrilled to welcome the new AS350 Level D simulator to the training curriculum," said Mike Allen, president of air medical services at Air Methods. "Our company's number one priority is to provide 24/7 access to lifesaving care to patients in need, with a focus on quality of care and a commitment to safety in aviation. With the addition of these four best-in-class full-motion simulators, Air Methods is taking critical steps to ensure the safety of our passengers and hardworking team members in the air."

Air Methods partnered with FlightSafety to develop and manufacture the newer Level D qualified simulators — the Airbus AS350 B3, Bell 407GX and Airbus EC130 T2 — which will be the first of their kind in the United States. The final two simulators are scheduled to enter service later this year. Together, the four devices will represent training for 75 percent of Air Methods' fleet.

"Air Methods is setting a new safety standard for their training by insisting on Level D qualified simulator-based training for their pilots who fly single- and twin-engine helicopters," said Bruce Whitman, FlightSafety chairman, president and CEO. "FlightSafety is proud to be working with Air Methods to enhance safety through high quality, cost-effective training solutions and services."

Air Methods employs more than 1,300 pilots across the country and provides 1,600 recurrent checkrides per year. The Colorado Learning Center, which also offers classrooms and a full complement of customer service areas, will offer four-day training for the vast majority of the company's aviators.

Boston MedFlight gains FAA part 135 operating certificate

Boston MedFlight has successfully completed the lengthy process of becoming an FAA air carrier. **James De Boer Photo**

Boston MedFlight, a nonprofit organization founded 32 years ago that provides critical care medical transport by air and ground, has announced that it has completed the process to secure its own part 135 operating certificate from the U.S. Federal Aviation Administration.

On March 3, 2017, Boston MedFlight completed its first patient transport under the new operating certificate, transporting a critically ill adult by helicopter from Lowell General Hospital to Boston Medical Center in Massachusetts.

Given the stringent requirements of federal aviation regulations, most air medical providers utilize contract services to operate their aircraft, as Boston MedFlight has done since 1985. The process for an organization to qualify for its own part 135 certificate is lengthy and multifaceted.

The process requires extensive documentation of procedures to ensure safe operations, thorough inspection of aircraft and facilities, and finally, training and qualification of the pilots who will be operating under the new certificate. Meeting these complex federal requirements typically takes years to accomplish.

Rick Kenin, general manager of aviation operations for Boston MedFlight, described the key benefits to bringing aviation operations in-house: "The main difference is that we are now managing all aviation operations locally, maintaining complete operational control. And our aviation professionals, instead of being vendors or partners, will now be part of one team: the Boston MedFlight team; with a vested interest in the organization's success.

"From the perspective of our patients and our partners, however, they will not experience any change in our services or capabilities. Our priority has always been — and will remain — safe aviation operations. In line with our industry leadership in critical care transport medicine, being an independent air ambulance operator places Boston MedFlight in a very select group of organizations, as we are no longer simply a healthcare provider, but more significantly, a federally licensed air carrier."

AMS Heli Design debuts quick-change EMS interior

AMS launched its new quick-change EMS interior for Leonardo AW119 and AW109 helicopters at HAI Heli-Expo 2017. **AMS Heli Design Photos**

BY BEN FORREST

AMS Heli Design has launched a new lightweight, removable emergency medical services (EMS) interior for Leonardo AW119 and AW109 helicopters.

The interior makes extensive use of composites, sturdy carbon fiber materials and kydex — a line of thermoplastic acrylic-polyvinyl chloride materials. It can be fully removed in less than three minutes for cleaning and quick change purposes, said Andrea Girolin, chief executive officer of AMS Heli Design.

"I'm proud of the product we have created and presented," said Girolin in a statement after HAI Heli-Expo 2017 in Dallas, Texas, where his company launched the new interior.

"Many customers enthusiastically came back several times asking for a new demo to their pilots, technicians and paramedics, and that was the best gift to us."

The interior kit was created for an EMS operator in South Africa 10 years ago and improved with feedback from doctors and paramedics, as well as new technology, said Girolin. AMS Heli Design bought all rights to the kit two years ago and at press time expected to receive a Federal Aviation Administration supplemental type certificate for the improved kit by May 2017.

The interior is customizable and can feature night vision goggle-compatible lights, electrical outlets, a high-capacity oxygen system, medical air and suction provisions and a turret topped with an articulating stretcher that allows patients to be loaded feet-first into the helicopter and then turned roughly 90 degrees so the stretcher is parallel to the helicopter doors.

"This is the sole EMS interior with an articulating stretcher available on the market for the AW119 Koala," said Girolin. "Further, the design allows free stretcher movement inside the cabin with no requirement to raise or remove any seat backrest. This is game-changing in day-to-day operations, permitting comfortable, quick and easy loading and unloading of the patient.

"Sometimes minutes count, and our interior can make the difference."

The total weight of the interior is roughly 190 pounds (86 kilograms), which is a huge savings and allows significant improvements in a helicopter's capabilities, range and performance, said Girolin.

The ability to remove and re-install the interior so quickly allows deep blood cleaning as often as needed. "This is a great advantage for corrosion prevention and clean daily operations," said Girolin.

While it has applications in the EMS market, Girolin noted the interior would also be suitable for multi-role helicopters that need to be reconfigured often and quickly.

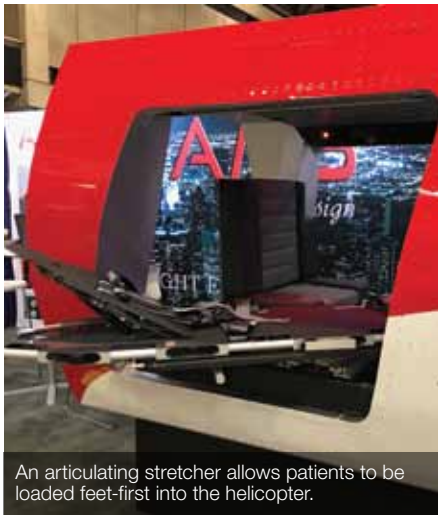
"I'm sure that we can bring the quick change capabilities into great advantage for operators that can go into search-and-rescue or utility or oil-and-gas, or who are using the helicopter for several missions," he said.

It takes 40 man hours to initially install the interior in a green helicopter, with work taking place either at the AMS Heli Design facility in Grande Prairie, Texas, or at a customer's facility.

The interior has been chosen by the South African Red Cross to be installed on three new AW119Kx helicopters and on another five helicopters that will join the fleet in 2017 and 2018, said Girolin. He anticipates a good market, helped by weight savings and the interior's design.

As for the long-term future, AMS Heli Design may update the interior to suit other single-engine helicopters such as the Airbus H130 and Bell 407, as well as twin-engine aircraft like the Leonardo AW169 and AW139.

"I see possibilities to take this kind of technology, design, engineering and materials to create a lightweight and operations-friendly, fully equipped EMS kit on those platforms," said Girolin. "We are starting discussions with operators to have a launch customer to initiate the development."


An articulating stretcher allows patients to be loaded feet-first into the helicopter.

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CoxHealth adds second MD Explorer to fleet

MD Helicopters, Inc. (MDHI) has announced the expansion of the CoxHealth air medical fleet to include a second MD Explorer helicopter.

Springfield, Missouri-based CoxHealth has purchased an MD 900 Explorer from MDHI that was previously operated by the Dutch Police and the United States Coast Guard. The light twin-engine helicopter will be upgraded at MDHI's Mesa, Arizona, Factory Service Center, where it will be converted to a "zero-time" MD 902.

The MD 900-to-902 upgrade is offered exclusively by MDHI.

"We are honored the team at CoxHealth chose to expand their air medical fleet with another MD Explorer," said Craig Kitchen, chief commercial officer for MD Helicopters. "This aircraft is absolutely perfect for EMS [emergency medical service]/air ambulance operators; delivering excellent maneuverability, increased safety and low operating costs."

Missouri-based CoxHealth is adding a second MD Explorer to its fleet. **MDHI Photo**

This acquisition is part of CoxHealth's commitment to deliver operational economies and improve patient care at its growing network of hospitals and health care facilities.

"The addition of this helicopter to our air ambulance fleet will improve our ability to deliver lifesaving patient care to those who might otherwise be unreachable," said Susan Crum, RN, Cox Air Care program director. "The MD 902 is fast and has a great range — allowing us to cover an area up to 300 miles away from our base in Springfield. It also offers a large cabin and smooth flight which combine to allow our in-flight medical crews to safely deliver the critical care that could be the difference between life and death."

Following completion of the 900-to-902 conversion, which includes a pair of new Pratt & Whitney Canada PW207E turboshaft engines, an integrated instrument display system (IIDS), revised engine air inlets, improved NOTAR inlet design, and a more powerful stabilizer control system, the CoxHealth MD 902 will also be outfitted with a wire strike protection system, Nightscanner Plus HID retractable searchlight, the Garmin GMX 200 multi-function display (MFD), the Technisonic TDFM 7000 multi-band radio, a GNS 430W all-in-one GPS/Nav/Comm solution, Outerlink's aircraft satellite tracking system, and an improved United Rotorcraft Air Methods EMS interior.

CoxHealth's MD 902 will also become the first commercial aircraft to receive the all-new Genesys Aerosystems advanced IDU-680 integrated all-glass cockpit, announced at HAI Heli-Expo 2017.

Bell 429 gaining traction for HEMS missions in China

Bell Helicopter and Beijing Yugao Aviation Group (YGA) announced a signed purchase agreement for a Bell 429 during the Asian Business Aviation Conference & Exhibition (ABACE). This is the customer's first aircraft and will be used for helicopter emergency medical service (HEMS) and search-and-rescue transport.

Established in 2007, YGA is a general aviation business group in China committed to providing customers with comprehensive, professional and efficient services including leasing, sales, flight training and airport management.

"Following the announcement of our first-ever HEMS Bell 429 delivery to China, we are thrilled Beijing Yugao Aviation has selected this incredible aircraft to serve life-saving missions throughout the region," said Patrick Moulay, executive vice president, global commercial sales and marketing. "Beijing Yugao Aviation is eager to begin operating the Bell 429, and we look forward to supporting their missions and continuing to expand our presence in the HEMS segment in China."

The first HEMS Bell 429 delivery in China was made to Reignwood Investment, Ltd., and will serve as the first Bell helicopter for HEMS missions in the country.

"We are proud to partner with United Rotorcraft to deliver the first HEMS Bell 429 to our friends at Reignwood," said Moulay. "There is a critical need for HEMS in China and we are honored Reignwood has selected the Bell 429 to assist in life-saving missions."

United Rotorcraft installed the medical interior, which consists of a machined aluminum floor, additional medical crew seating configurations, and product improvements for patient care and access. In addition, the aircraft is equipped with a rescue hoist and other program specific support equipment.

"This delivery and Civil Aviation Authority of China (CAAC) validation for the medical interior represents a two-year effort to bring our product into China and we are delighted to be working with Bell Helicopter and entering this new market segment," said Frank Graham, senior director of global sales and marketing for United Rotorcraft. "We are confident this will be the first of many opportunities in China available to us because of our product's CAAC validation."

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Extreme Team-Building

Survival Systems USA has leveraged its expertise in aviation survival and egress training to offer a new kind of team-building experience.

Survival Systems USA's new Leadership and Team Development Program helps small groups enhance their team dynamics while gaining valuable survival skills. **Survival Systems USA Photo**

BY ELAN HEAD

Survival Systems USA has discovered a new market for its underwater egress training.

The Connecticut-based company is already well known within the helicopter community for its aviation survival and egress training (ASET) courses, which fulfill an important requirement for many pilots and crewmembers who routinely operate over water. Now, the company is branching out by offering the same demanding survival training for corporations that are looking for a new approach to team-building.

Survival Systems USA's new Leadership and Team Development Program uses in-water survival exercises to help small groups enhance their team dynamics and leadership skills, while gaining valuable survival skills at the same time. The program has gotten significant media attention since its launch in late 2016, with profiles by outlets including the *New York Times* and the *Today Show*.

According to Survival Systems USA commercial business developer Adrienne Romano, the program was inspired by a client who contacted the company in search of a team-building activity that was "outside the box." Survival Systems USA created a full-day leadership program based on its popular ASET courses, which has since evolved into the Leadership and Team Development Program.

Like the company's standard ASET courses, this program starts with ground instruction and thorough safety briefings. Participants then move into the training pool, where they progress through a series of water survival exercises and group survival techniques. The course concludes in Survival Systems' Modular Egress Training Simulator (colloquially known as the "dunker") with a simulated water impact and breath-hold underwater egress.

What distinguishes the Leadership and Team Development Program is that participants take turns leading their colleagues through the survival exercises. "It's all about each individual person taking that leadership role," explained Romano. "It gives different people the opportunity to take those roles."

To maintain the quality of the small-group experience, Survival Systems USA generally limits the maximum number of participants per course to 12. However, the company is currently developing an abbreviated, half-day version of the course, which will allow groups of up to 24 people to be accommodated in a day. The cost for the full-day course is US$950 per person, while the abbreviated course is expected to cost significantly less.

While the program has been attracting attention in the corporate world, Romano said that Survival Systems USA has also seen interest from some aviation organizations that have already sent pilots or other crewmembers through ASET training.

"They're saying, 'This would be great for our marketing department, our PR department, our human resources department,'" Romano said. Pointing out that "there are a lot of people who work alongside aviators," she suggested that not only is the course a great bonding experience for these personnel — it might also give them a better appreciation for what their aviator colleagues have to go through.

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CAMTS to add IIMC training to standards

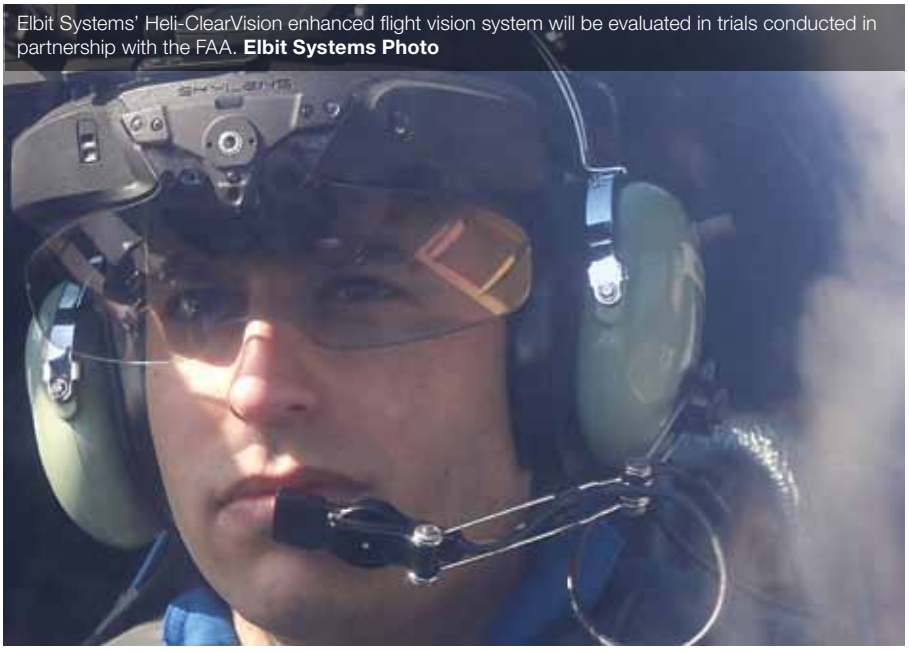
The Commission on Accreditation of Medical Transport Systems (CAMTS) has announced that the next revision to the CAMTS Standards will encourage additional helicopter instrument flight rules (IFR) training requirements.

The draft of the recommendation, to be incorporated into the 11th Edition of the CAMTS Standards, will require quarterly inadvertent instrument meteorological condition (IIMC) training and demonstration of the pilot's ability to safely maneuver the helicopter into visual meteorological conditions (VMC) following an inadvertent encounter with IMC and completion of an IFR approach.

For instrument proficiency training in non-IFR-certified rotorcraft, the pilot should perform such maneuvers as are appropriate to the rotorcraft's installed equipment, the certificate holder's operations specifications, and the operating environment.

This proposed future revision of the CAMTS Standards is being recommended by the CAMTS aviation and safety advisory committee, composed of industry safety experts including non-CAMTS board members. Final verbiage for the 11th Edition of the CAMTS Standards will be approved by the CAMTS board of directors prior to incorporation.

Elbit Systems teams with FAA to research EFVS



Elbit Systems' Heli-ClearVision enhanced flight vision system will be evaluated in trials conducted in partnership with the FAA. **Elbit Systems Photo**

Elbit Systems has teamed with the U.S. Federal Aviation Administration (FAA) as a research partner to study operational concepts for the use of enhanced flight vision systems (EFVS) in helicopters. The study will help lay the foundation for the future implementation of EFVS in rotorcraft.

While EFVS rules currently exist for approaches to runways at airports, comparable regulations for EFVS do not exist for helicopters flying to onshore or offshore helipads at heliports. In addition, the unique aspects of helicopter flight and the visual cues generated require additional considerations beyond the typical head-up displays (HUDs) used today.

As part of the study, Elbit Systems will install the Heli-ClearVision EFVS in the FAA's Sikorsky S-76 helicopter to be used as the evaluation platform. The system will include several subsystems such as the revolutionary Skylens/SkyVis wearable head-worn display, the HeliEVS, synthetic vision system (SVS) and a combined vision system (CVS).

The study will consist of several flights to assess operational concepts and sensor characterization criteria for maintaining visual references/cues during the visual segments of instrument approach procedures and enhancing visual flight rules (VFR) operations. Flights are planned to occur in different weather conditions, times of day, and via different approach types. The results of the study will be used to evaluate the overall contribution of EFVS technology to flight safety and operational effectiveness for helicopters.

"We are proud to cooperate with the FAA in regulating enhanced vision operation for rotorcraft," said Yoram Shmuely, general manager of Elbit Systems' aerospace division. "This technology will enable many lifesaving missions and will significantly increase the safety of the flying crew."

At HAI Heli-Expo 2017 in March, Elbit also announced that it has signed a long-term agreement with Leonardo Helicopters to jointly market and equip Leonardo's line of commercial helicopters with the latest Heli-ClearVision EFVS.

"Our teaming with Elbit Systems strongly contributes to our commitment to enhancing the flight experience of pilots flying Leonardo helicopters," said Leonardo Helicopters managing director Daniele Romiti. "By offering these cutting-edge systems and technologies on our new-generation platforms we position Leonardo Helicopters more and more as the most capable helicopter to perform any mission with high safety in all weather conditions."

At Heli-Expo, Dror Yahav, Elbit Systems' vice president of Commercial Aviation, told *Vertical 911* that the company is seeing particularly strong interest in Heli-ClearVision from the emergency medical services sector. According to Yahav, Elbit is aiming for initial certification of the system by the European Aviation Safety Agency in 2018. The starting cost for the system is expected to be around US$100,000.

If you would like to submit a press release or if you have a new product or service that you believe is newsworthy, please e-mail our news editor at news@verticalmag.com.

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WHAT'S NEW FOR SAR

A number of new search-and-rescue (SAR) products have recently hit the market, just in time for the busy summer season. From a more capable personal tracking device to a lighter-weight night vision goggle and helmet combination, here is a look at some of the innovative new products available to enhance helicopter SAR operations.

by Jen Boyer

ASU'S LIGHTER, MORE COMFORTABLE HELMET COMBO

Aviation Specialties Unlimited, Inc. (ASU) is aiming to improve the night vision goggle (NVG) experience with a new NVG mount, battery pack and helmet combination. The lightweight, rugged combo is designed to create a more comfortable mission experience by decreasing neck strain without sacrificing durability or protection. It features ASU's new aviation night vision helmet mount, an Aeronox battery pack, a Paraclete Aviation Life Support helmet with the Kairos retention assembly, and ASU's white phosphor night vision goggles.

"This combination of the new helmet and mount vastly improves the user experience," said ASU senior business development manager Kim Harris. "As a pilot that has flown with night vision goggles for decades, I have experienced first-hand how much the lighter helmet, battery pack and goggle mount can decrease strain on a pilot or crewmember wearing the equipment. When flying several missions, every ounce matters."

asu-nvg.com

HONEYWELL SATELLITE-BASED PERSONAL TRACKER

Honeywell's new satellite-based Personal Tracker utilizes Iridium's low-earth orbit satellite network to track and communicate with users in remote locations anywhere in the world — across oceans, in the air, and even within the polar regions. Users can share their location with GPS coordinates and send text messages using the ultra-rugged device, which is certified to function in hazardous environments. The Personal Tracker can be used as a stand-alone, two-way communications device or can be clipped to a backpack to serve as a tracking beacon. It can also be paired with an iPhone, allowing users to access a Honeywell mobile app offering features such as interactive SOS, messaging, push notifications, trip information and situational awareness. It's another way to ensure peace of mind when crewmembers have to be temporarily stationed or left behind in remote locations during rescue operations.

honeywell.com

CASCADE RESCUE STABLEFLIGHT HELI-BAG

Cascade Rescue's new StableFlight helicopter rescue bag is designed to stabilize and fully protect patients during hoist and long-line helicopter extractions. This next-generation rescue bag is constructed of water- and wind-resistant Perlon PES fabric and features fully padded head protection, external compression/restraint straps, 10 side carry handles, and a sewn-in diagonal weight bearing system for optimum patient support. To assure stability, the rescue bag utilizes 10 static lines to evenly distribute weight throughout the suspension system.

StableFlight can be used with a tagline in non-attended hoists, or without a tagline in dual-hoist or "attended" operations with Cascade Rescue's innovative new Rotation Breaking System (RBS). Additional options include an internal patient restraint system with Cobra buckles, vertical positioning system, in-helicopter tie-down system, Ultra-Tuff vacuum mattress, and a transparent face shield/hood. The StableFlight helicopter rescue bag weighs 12.5 pounds (5.7 kilograms), or 14.6 lbs. (6.6 kg) with optional internal restraint system.

cascade-rescue.com

AXNES MP30 WIRELESS INTERCOM

A smaller, lighter, and lower-cost alternative to last year's MP50, the AXNES MP30 handheld transceiver includes many of the same comprehensive features including single band UHF frequencies, full duplex transmission and reception, built-in noise and echo cancelling, and secure proprietary waveform and protocol technology. The MP30 housing is made of water- and dust-resistant aircraft grade aluminum.

The MP30 promises a 15-hour battery life with 40 hours of standby capability and a night vision goggle (NVG) compatible screen with both voice activated (VOX) and push to talk (PTT) functions. The intercom is also designed with secure voice technology.

Options for the new MP30 include GPS positioning, AES 256 software encryption, and, for quantity orders, custom headset or helmet connector options.

www.axnes.com

BREEZE-EASTERN ILLUMINATED BUMPER

In response to operators' need for greater illumination and visibility during night rescues or low-light conditions, Breeze-Eastern Corporation's new illuminated bumper is designed for quick and easy installation on the company's hook assemblies. Powered by a long-life rechargeable battery and using energy-efficient light-emitting diode (LED) elements for illumination, the bumper's expected service life is 5,000 hours or five years of field service.

The illuminated bumper is field-replaceable without disassembling hook components. Designed for use during hovering rescue missions, it features 14 light tubes that are integrated into the structure and powered by two rechargeable batteries, providing adjustable light intensity with optical clarity up to 200 meters in low light at any angle.

The illuminated bumper is in the Federal Aviation Administration (FAA) certification process with approval expected later this year.

breeze-eastern.com

CAPEWELL AERIAL SYSTEMS LLC 'HI-VIZ' AUTO-LOK HELICOPTER RESCUE HOOK

Capewell Aerial System's Auto-Lok rescue hook is now available with a durable "Hi-Viz" coating for added safety and visibility. Stormy weather, smoke, fog, high seas, and other environmental factors can obscure normal metallic rescue hooks, making them difficult to see and deploy — often in high-stress situations. And as Capewell has pointed out, a swinging hook that is difficult to see can be a real danger to crews and victims alike.

The new hook features Capewell's Auto-Lok fail-safe design with a durable neon yellow coating to increase visibility even in tough conditions, including poor weather and underwater. The latch lever is coated in contrasting bright orange, making it easily distinguishable. Designed to be operated with one hand, the Auto-Lok hook is compatible with all helicopter hoist systems and has a large capacity to accommodate multiple rings and carabiners. There is also a ¾-inch eye incorporated in the body of the hook for equipment, trail/tagline hookup, or the addition of a chemlight. The hook has been tested to an ultimate load of over 16,000 pounds (7,255 kilograms).

capewellaerialsystems.com

Capewell's Auto-Lok rescue hook (top). The company's Slide-Lok hook (bottom) is also available in a high-viz coating.

SWITLIK FLOTATION COLLAR

The Switlik Flotation Collar is a lightweight, low-profile flotation device for overwater lifting operations. FAA TSO-C13d approved, it integrates with popular commercially available harnesses using over-the-shoulder straps, eliminating the bulk and interference of a life vest on top of a harness. The yoke-style flotation collar design incorporates lacing flaps on the underside of the device that close around the shoulder straps of the harness just above the chest strap, making a secure connection and creating a low profile.

The collar's back strap feeds through the D-ring on the back of the harness and attaches to the waist strap, further securing the fit, eliminating interference, and reducing bulk. High visibility beaded red handles are located on both sides of the life preserver for quick and simple deployment utilizing two 18-gram CO2 cylinders. Once attached, the collar becomes an extension of the harness for all over-water applications. The collar can also be removed from the harness to serve as a personal life preserver.

switlik.com

Faces of Fighting Eagles

By Elan Head
Photos by CW3 Jeffrey Kennedy

When U.S. Army CW3 Jeffrey Kennedy deployed to Afghanistan last fall, he knew that he wanted to take lots of photographs. This would be the UH-60 Black Hawk pilot's fourth combat deployment, and with retirement on the horizon, he wanted to preserve a record of the experience for himself and his fellow soldiers.

"A lot of these soldiers come out here and they don't take pictures, and I've done that on previous deployments, where I didn't take enough photos," Kennedy told *Vertical 911*. "The few that I have I really like to have them, and I like to show my kid. . . . This was going to be my last deployment, and I wanted to share with my unit, my organization, and some of our younger soldiers, the ability to take pictures for them and have good-quality pictures that they could maybe frame and put in their house and look back on."

That desire to share became Faces of the 2-1 Fighting Eagles, a Facebook page where Kennedy posted glimpses into the life of soldiers with the 2nd General Support Aviation Battalion, 1st Aviation Regiment, 1st Combat Aviation Brigade out of Fort Riley, Kansas. The photos on these pages are just a few of the hundreds that Kennedy shared online during his nine months based at Bagram Airfield.

With the American presence in Afghanistan now in its 16th year, Kennedy thinks it's important to highlight the sacrifices that are still being made by soldiers in that country, day in and day out.

"One thing I would like people to understand is that there's still a threat over here for our soldiers. We may be in more of a teach and assist role, but soldiers still get injured and killed regularly over here," he said. "I think that some people take that for granted, and they don't realize that every soldier that serves in today's Army is volunteer force. . . .

"We've had a lot of soldiers that have had their first-born babies while deployed, or a death in the family, or something significant that happened, and they're not home for it. Sometimes they do get to go home for it, sometimes they do not. It is a huge sacrifice on their families back home. I'm very appreciative of the people I serve with, and that serve our nation."

SFC Ortiz, a "Boomer Dustoff" medic, clears ice and snow from a Sikorsky HH-60M helicopter prior to assuming duty. The Boomer Dustoff name traces its lineage back to the 57th Medical Detachment, Helicopter Ambulance, and Army Maj. Charles I. Kelley, considered to be a founding father of modern helicopter medevac.

CW2 Hawkins of C Co 3-1 "Black Sheep" flies a mission in support of Operation Freedom's Sentinel (OFS). The 13-year War in Afghanistan, Operation Enduring Freedom, officially transitioned to the training and advisory mission OFS on Jan. 1, 2015. However, Afghanistan remains a dangerous place for the soldiers assigned to the country.

A crewmember with B Co 2-211th provides obstacle clearance during a mission.

1LT Crandall grabbed the camera for this shot of photographer CW3 Jeffrey Kennedy. During his most recent deployment, Kennedy surpassed 1,000 hours of combat flying and 1,000 hours of flight time in Afghanistan. "So I'm pretty much an Afghanistan tour guide," he laughed.

1LT McDowell and SFC Bernier of the Aviation Reaction Force Able Platoon watch soldiers hook up a sling load on a UH-60M helicopter.

A Task Force Fighting Eagle brown team comes in to land. A brown team is composed of a Sikorsky UH-60 and a Boeing CH-47F. Roughly a brigade's worth of aircraft deployed with the task force.

A CH-47F Chinook of B Co 2-211 waits on the ramp before a flight to Kabul.

SPC Corpus of the A Co 2-1 "Aces" works on the tail of a UH-60L.

SGT Gumabon of A Co 2-1 "Aces" performs post-flight maintenance on a UH-60L as the sun goes down in Bagram.

An Air Force pararescue specialist or "PJ" hoists onto a B Co 2-211 Chinook during joint training at Bagram Airfield.

SPC Sarandis of C Co 2-1 Boomer Dustoff washes an HH-60M helicopter.

Flowers on the ramp near helicopter parking at Bagram Airfield.

A Boomer Dustoff HH-60M helicopter at rest.

A Boeing AH-64 Apache from B Co 1-1 “Wolfpack” taxis in while the sun disappears behind the mountains at Bagram.

A member of D Co 2-1 performs scheduled maintenance work for a UH-60M.

The view from above: a village in the mountains of Afghanistan.

Toll's ACE center uses high-fidelity simulation to support in-aircraft training.

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TOTALLY ACE

Australia's Toll Helicopters has established an impressive Leonardo-approved training facility designed specifically for EMS operations.

Story & Photos by Paul Sadler

Toll Helicopters' Aeromedical Crewing Excellence (ACE) Training Center at Bankstown Airport, west of Sydney, has revolutionized emergency medical services (EMS) and search-and-rescue (SAR) training in Australia and is now a new benchmark for the rest of the world.

The center was set up to train Toll's own pilots and aircrew — along with paramedics and doctors from the New South Wales (NSW) and the Australian Capital Territory ACT) ambulance services — for a new 10-year aeromedical retrieval and rescue contract for the state's heath department. The contract has Toll operating a fleet of eight Leonardo AW139 helicopters across four bases.

The training center occupies a stand-alone facility behind Toll's operational rescue base at the airport. Inside is a CAE 3000 Series AW139 Level D full-flight motion simulator, a Survival Systems Mets 30 Helicopter Underwater Escape Training (HUET) simulator, and a virtual reality-based Complete Aircrew Training System (CATS). The center also includes a wet and dry winch simulator, a 120-seat theater, and space for a second full-motion simulator.

The ACE center has 11 dedicated instructors. These include four pilot instructors, one HUET instructor, three crewman trainers, and three instructors who are online to fly missions as part of the crew, and who stay contemporary and up-to-date with procedures while undertaking crew training when appropriate to do so.

With its use of high-fidelity simulation to support in-aircraft training, Toll's ACE center has led to improved operational capabilities and safer operations for its ambulance contracts. However, above its contract requirements, Toll Helicopters is offering European Aviation Safety Agency and U.S. Federal Aviation Administration approved AW139 training to external individuals and operators, and can develop tailor-made HUET and air crewman training courses for a specific company's needs.

Three instructors fly online missions as part of the crew to stay contemporary and up-to-date with procedures, while undertaking crew training when appropriate to do so.

"Our ACE training center and program is really innovative and a step change for the world of how to train for EMS," said Toll Helicopters chief pilot Colin Gunn. "ACE is a level of fidelity that is not available anywhere else to civilian operators. And when we talk HUET, it's not just rolling upside down in a cage in a pool and tick a box to say 'you're current,' we are putting people in a program where they build up to Sea State 2 or 3 with wind, with rain, in darkness with lightning and thunder. We're doing the best for our crews to ensure they get to go home after work to see their families."

Aircrew who have previously used legacy HUET trainers, and who have now used the Mets 30 HUET device with all of its add-on sensory features at the ACE center, say it is an experience that is as close to reality as they could want to get.

Resurfacing from a successful egress from the inverted and submerged cabin, dual fans simulate winds up to 145 kilometers per hour (90 miles per hour) and a single fan positioned above simulates the downwash of a hovering AW139 tasked to winch you from the water. A large bobbing "ball" at the end of the pool whips up three-foot waves. Strobe lighting, synchronized to a sound system, authentically replicates a thunderstorm and is mixed in with audio of the helicopter. It is exhilarating stuff, and that's just observing from beside the pool.

"Participants so far have said our HUET is extra challenging, particularly to pop out the windows with realistic forces of being underwater," said Gunn. "We add the extra dimension of training where you are winched out of your life raft and up into the helicopter with simulated downwash, the noise and three-foot waves. What we are doing is the next step towards reality and it is really being welcomed in the industry. It brings home the dangerous nature of the situation crews may face. They are trained better, which is the ultimate aim."

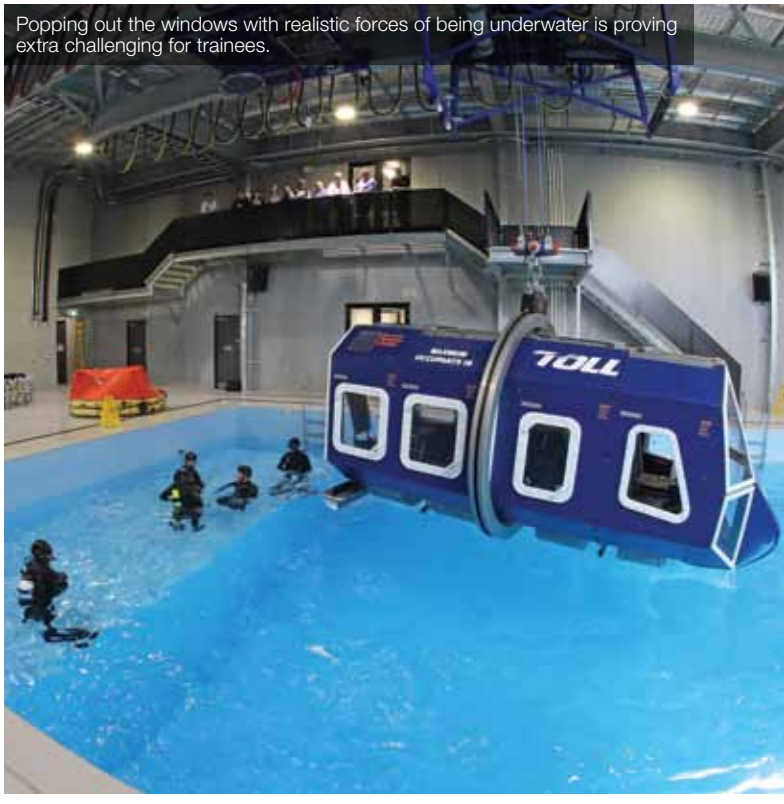
At first glance, Toll's CATS device is merely a skeletal shell of an AW139 cabin. After putting on a set of virtual reality (VR) goggles attached to a headset, however, you are instantly immersed in an environment with graphics so crisp and detailed that after a few moments you start believing you are in fact sitting in the rear cabin of an AW139.

Developed by Australia's Virtual Simulation Systems of Anna Bay, Port Stephens, the recent addition of an accurate cockpit with a domed screen in front of the CATS device means pilots can fly the mission for the crew. During an exercise, the crew sitting in the cabin see the same synchronized graphics through their VR goggles as what is being projected on the screen for the pilot. Crewmen can give guidance to maneuver the helicopter for a confined area operation or for a winch rescue.

"The graphics are very high quality and have enough hover references for the pilots to conduct a realistic winch accurately while achieving the training outcomes the crewman needs as well," said Gunn. "Now we can do combined training front and back seat at the same time with emergency malfunctions and all of the other scenarios that we can throw at it."

Toll operates a fleet of eight Leonardo AW139 helicopters across four bases for its NSW and ACT ambulance contracts.

The CAE 3000 Series AW139 Level D full-flight motion simulator.



Popping out the windows with realistic forces of being underwater is proving extra challenging for trainees.

"Rescue 207" taxis out for Toll's first mission of its new 10-year contract.

The ACE Training Center at Sydney's Bankstown Airport.

Dual fans simulate winds up to 145 kilometers per hour (90 miles per hour) for the HUET pool.

The CATS has enough hover references for the pilots to conduct a realistic winch for the crew.

“WE ARE ABOUT MODERN, CONTEMPORARY HELICOPTER SAR EMS HUMAN FACTORS TRAINING WHICH IS RELEVANT NOW — TODAY.”

Since starting its NSW Ambulance contract in February, Toll has flown some challenging sorties, which most of its crews have been exposed to over their careers. However, the details of any missions that offer up some new challenges to the crews are entered into a Aeromedical Crew Resourcing Management program as part of the standard debrief after every mission.

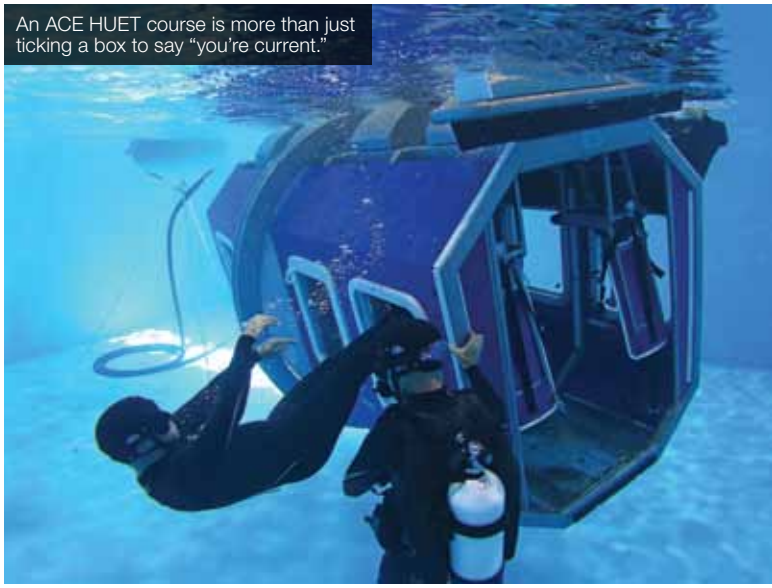
“We are investing in the best software we could find in the world for helicopter flight data monitoring systems,” said Gunn. “What this will mean is if we have a learning incident or a human factors event we will log that as a quality report to learn from. So if something happens on a Monday, then we want that being instructing it in the CATS or in the Level D sim by the Wednesday so we are completely relevant and contemporary. We are about modern, contemporary helicopter SAR EMS human factors training which is relevant now — today.”

Paul Sadler | An Australian-based freelance photographer and journalist who has covered the civil and military rotary-wing industries for more than 24 years. Full-time, Paul is a media and communication manager within the Australian aviation industry, having worked for government and private companies.

Toll Helicopters chief pilot Colin Gunn. He described ACE as “a step change for the world of how to train for EMS.”

The ACE has 11 dedicated instructors including four pilot instructors.

Inside the virtual-reality CATS device.



An ACE HUET course is more than just ticking a box to say “you’re current.”

NO *High Heels* IN THE High Hills

Heli-Austria crewmember Claudia Juen is an accomplished mountain rescuer who also holds a surprising day job.

Story & Photos by Tomas Kika

You simply can't overlook her pink helmet, be it in the left front seat of the red Heli-Austria MD 902 Explorer, or on the slope rushing to a patient along with a doctor and a large medical backpack.

"Patients are often surprised," admitted 38-year-old Claudia Juen, the only female helicopter emergency medical services (HEMS) crewmember in the Austrian Alps, "but always in a positive way! Especially if we come with a lady doctor colleague together. Well, we have no female pilot at Martin Flugrettung, so a three-lady crew is unfortunately not possible at this time."

A technical crewmember trained in helicopter hoist operations, human external cargo and mountain rescue, Juen flies with the rescue subsidiary of Heli-Austria, the Austrian helicopter company led by progressive entrepreneur and pilot Roy Knaus. Known for its expertise in technical rescues and high-altitude operations in the Austrian Alps, Martin Flugrettung mainly operates MD 902 Explorer helicopters *(see p.62, Vertical 911, Fall 2015)* although these will soon be replaced by the new Airbus Helicopters H135 (EC135 T3).

When the occasion calls for it, Juen is all business, but behind the serious look is a little girl's dream that began when she watched a helicopter landing on a ski slope.

"It all must have started there, at a rather young age — while skiing with one of my five sisters, I happened to be watching a helicopter on a rescue mission," Juen recalled. "A lot of noise, wind and power, but so awesome at the same time!"

Growing up at the foothills of the Alps some 1,500 meters (4,900 feet) above sea level, mountaineering became a natural part of Claudia's life. Due to a family situation, she had to take over some duties at their own local farm relatively early in her childhood. She later spent time just down the road, in the luxury ski resort town of Ischgl, where she slipped into a job in tourism.

In fact, if you ever walk into the central Elizabeth Arthotel in Ischgl, it may well happen that Juen's broad smile welcomes you at the reception desk.

"I am responsible for sales and marketing at one of the top-notch hotels in Ischgl, that is my main job," explained an elegantly dressed Juen while sitting in the hotel's lounge, her high heels making it hard to believe that two to five times a month she jumps into a twin-turbine helicopter and heads towards the summits to help those in need.

Click here to watch the video

Claudia Juen, 38, is currently the only female helicopter emergency medical services crewmember in the Austrian Alps.

For more than 12 years, Juen has been returning on missions to the slopes of Ischgl, which is also the place where her helicopter rescue dream was born.

"We only have two or three full-time HEMS crew members at Martin Flugrettung," she said. "A broad base of HEMS crewmembers and doctors taking duties in addition to their main job is very common here in Austria, and I also do find it smart."

When asked whether she prefers high heels or high hills, Juen was quick with an answer: "Both! But not at the same time. It is 50-50, I'd say. I love the mountains and chose to spend my life there, but at the same time, I am not a person wearing trekking shoes everywhere all year round."

THE PATH TO THE TOP

Juen's journey to Martin Flugrettung was a lengthy one. Along with her high-heels job, Juen spent enough time in the surrounding high hills to qualify as a mountain rescuer. Pursuing her passion for rescue further, she got involved with the Austrian Red Cross, training to become an instructor as well as a team leader for catastrophic emergencies.

Juen used every day off from work to pursue her studies in emergency medicine. After many hundreds of hours of practical training, she was offered a volunteer position with a local helicopter company.

"A SOLID HELICOPTER MOUNTAIN RESCUER SHOULD BE ABLE TO SAFELY OPERATE IN THE ALPINE, OFTEN VERY EXPOSED, AREA. IF ONE CANNOT MANAGE TO SURVIVE IN ALPINE CONDITIONS, IT IS VERY DIFFICULT TO TRY HELPING OR RESCUING OTHERS."

"I was lucky to receive an extensive winch operator training from Swiss helicopter rescue company Rega," she said. "After countless hours flown and many lessons learned I became the only female certified winch operator instructor in Austria."

Since 2005, Juen has flown some 1,300 rescue missions in the Austrian Alps. Heli-Austria recently took delivery of the first of four hoist-equipped H135s, so Juen's skills and experience should prove valuable as Martin Flugrettung transitions to winch operations. Already, she is one of only a few HEMS crewmembers in the company who can supervise new crewmembers during their on-the-job training.

Rarely will you spot Juen not active. "This is my day off," Juen said while kneeling in the cabin of the red MD 902 at the Martin 2 base near the small town of Karres, enthusiastically cleaning medical equipment in between rescue missions. Her days usually start early. "I am an early bird, but I love to sleep," she said.

A talent for organization helps Juen stay focused, even through the most stressful days. "If things are organized, they more likely go well, even if it is under demanding conditions or a lot of stuff at the same time," she said.

Good organizational skills are essential to the success of every rescue mission.

There's no difference between men's and women's duties in the role of a HEMS crewmember in the Austrian Alps.

Whether in the air or on the slopes, you simply can't overlook Juen's bright pink helmet.

This emphasis on organization is an asset in her rescue work. As she observed, "There [are] a lot of checklists in aviation. I always follow my internal checklists and that is what I also try to suggest to my younger colleagues who come to fly for the supervision flights with me."

As an example, Juen described the procedure she follows every time she responds to a call for help. "It all starts with receiving the scramble message — as a very first task I take the coordinates and the message from the dispatch over the radio, [since] with the helmet on, one has difficulties to hear properly," she said. "Then I put the radio belt and the helmet on, only then I go to the helicopter which is ready to start the engines, and so I watch the process properly for the pilot from outside.

"I make a safety walk around the chopper, check the doors closed and systems work. Then I sit in. My cockpit doors are still open, so I fasten my waist seat belts first, plug the intercom in, then I close the doors so it gets more silent in the cockpit, and we can discuss the next steps with the crew. Only then I fasten the chest seat belts so that I have a freedom of movements as long as necessary. Then we confirm the most efficient track with the pilot and take off for the mission. I follow these steps every single time the same way."

RESPONDING TO THE CALL

In fact, that is just what Juen does when she departs on her next rescue mission in somewhat cloudy and rainy weather, with *Vertical 911* along for the ride.

"That is quite typical for me," she says, laughing. "I always receive the scramble message in a challenging weather. I got used to it, that's alright."

Weather is not the only stress factor that can be present in helicopter mountain rescue. According to Juen, noise, downwash and distorted radio messages, "combined with often very limited maneuverable space when offloaded somewhere on top of the ridge — that all can compile a serious bunch of problems if not trained properly."

From her instructor's perspective, Juen sees the success of a HEMS crewmember as being based on three key skill sets:

A crewmember's solid understanding of urgent medical procedures can be of great help to the doctor on scene.

"A solid helicopter mountain rescuer should be able to safely operate in the alpine, often very exposed, area. If one cannot manage to survive in alpine conditions, it is very difficult to try helping or rescuing others.

"Secondly, a good understanding of urgent medicine procedures and [medications] is of vast help to the doctor. Being one step ahead and fluently assisting the doctor who is taking care of heavily injured patient in demanding conditions could be crucial.

"Last but not least, and the most key asset of a good HEMS crewmember, is full assistance to the pilot. From refueling the aircraft through navigational help all the way to safety procedures, there is no room for mistakes in this one."

On this particular call, upon arriving at the site of the rescue, Juen controls the scene until the rotor stops turning. We're just meters away from an injured skier on the slopes of her home resort of Ischgl. She handles the stretchers with ease; her cooperation with the doctor, Christian Niederwanger, is reminiscent of a well-rehearsed play.

The patient, a 54-year-old skier with a thorax injury and suspected rib fracture, receives 15 milligrams of morphine in combination with 10 milligrams of metoclopramide. After a quick call to coordinate the transport, and upon re-positioning to the vacuum mattress, the patient is loaded into the MD 902 for the journey to the hospital in Zams.

Juen manages the space around the helicopter, and keeps an eye on the six o'clock position during the category A departure. Later, we ask her whether the perspective she gains from the air is also useful to her in her life on the ground. "There is no question about it," she says firmly, flipping up her helmet's sun visor. "The higher you fly, the more you see."

Tomas Kika | A certified helicopter and mountain rescuer as well as an experienced professional photographer. Specializing in photoreporting and visual storytelling, Tomas uses his diverse skills to capture images from extreme and demanding locations.

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A little-known search-and-rescue unit based at Fairchild Air Force Base in Washington state provides essential support to the U.S. Air Force and the occasional civilian in need.

Story & Photos by Skip Robinson

From its base at Fairchild Air Force Base near Spokane, Washington, the 36th Rescue Squadron (RQS) provides support to the U.S. Air Force's Survival, Evasion, Resistance and Escape (SERE) school. The squadron has been providing services for almost 50 years, and has been flying the same helicopter model — the Bell UH-1N Twin Huey — the entire time.

The 36th RQS is now the only Air Force UH-1N unit providing full-time search-and-rescue (SAR) services, as the Air Force's other UH-1Ns are primarily used for missile site support or VIP transport. Because there are relatively few hoist-equipped helicopters in the area around Spokane, civilians in Washington, Idaho and Montana have also benefitted from the day and night SAR capabilities of the 36th RQS, which has completed 692 civil rescues since its inception.

HISTORY

What is now the 36th RQS was first known as the 48th Aerospace Rescue and Recovery Squadron (ARRS). The unit was activated in 1971 under Military Airlift Command (later Air Mobility Command) and operated nine UH-1N Twin Hueys with a squadron strength of approximately 140 people.

In August 1976, the unit was re-designated Detachment 24, 40th ARRS, and downsized to five aircraft and 57 personnel. In November 1987, the unit was renamed Detachment 24, 37th Air Rescue Squadron. The unit changed from Air Mobility Command to Air Combat Command as Detachment 24, 92nd Operations Group on Feb. 1, 1993. On July 1 of that year, it became the 36th Rescue Flight and was transferred to Air Education and Training Command under the 336th Training Group at Fairchild. In August 2015, the unit regained its squadron designation and moved from the 336th Training Group to the 58th Operations Group.

A SERE instructor calls in the UH-1N for a pick-up. The 36th RQS supports the Air Force's Survival School in many ways.

The 36th RQS Twin Hueys are equipped for fast rope insertion operations, which are practiced by PJs and SERE combat rescue officers.

The 36th RQS currently operates four aircraft, with about a dozen pilots and a half-dozen special mission aviators.

Thanks to its location, the 36th RQS flies over some of the most beautiful country in the U.S. on a daily basis.

Varied terrain means the 36th RQS could be doing overwater work one day, and mountain training the next.

"OUR GOAL IN OUR MOUNTAIN COURSE IS NOT JUST TO PASS KNOWLEDGE OF POWER AWARENESS, WIND ANALYSIS, AND GOOD ESCAPE ROUTES — A BIG PART OF IT IS BUILDING CONFIDENCE."

The 36th RQS currently operates four UH-1N helicopters. The unit has about a dozen pilots, including the operations officer and squadron commander, and a half-dozen special mission aviators (SMAs). A typical 36th rescue crew comprises two pilots, an SMA and a medic. The medics who fly with the 36th are drawn from the 336th Training Support Squadron under the 336th Training Group.

The unit also has two aircrew flight equipment (AFE) airmen, two aircrew records managers, one chief of knowledge operations airman and two maintenance contractor officer representatives. Maintenance support is provided by 18 maintenance contractors, who fulfill six contract man-year equivalent (CME) positions. The 36th RQS commander is also the functional maintenance commander.

THE TWIN HUEY

The UH-1N has been largely retired from the U.S. Marine Corps (only MCAS Yuma operates a few for base SAR) and the Air Force is now moving forward with its on-again, off-again UH-1N replacement program. In the meantime, however, the Air Force still operates a number of Twin Hueys, which first entered service in late 1970, towards the end of the Vietnam War. Despite the model's nearly 50 years of service, the UH-1N is still considered a safe, reliable and capable aircraft.

The UH-1N is powered by 1,800-horsepower Pratt and Whitney PT6T/T400 Twin-Pac turbine engines and has a maximum gross weight of 10,500 pounds (4,760 kilograms). The 36th RQS Twin Hueys are kept as light as possible in order to accommodate a full range of mission equipment. The aircraft are equipped with forward-looking infrared (FLIR) cameras on a side mount. In addition to Goodrich internal hoists, the aircraft are equipped for fast rope insertion operations, and SERE combat rescue officers and pararescue specialists (PJs) train with fast ropes regularly.

In addition to the equipment mounted on the aircraft, additional SAR equipment includes a Stokes-type litter, a Forest Penetrator rescue seat, a rescue strop, stabilizing gear, and medical bags. During the cold winter months, extra survival gear and clothing are carried by the crew in case they have to make a precautionary landing in a remote area. For winter operations, the UH-1Ns are also equipped with "bear paw" skid shoes, which are attached to the aft part of the skids to prevent the aircraft from sinking in deep snow.

A Challenging Rescue

Although the 36th RQS typically performs only a handful of civilian rescues each year, those rescues can be exceptionally challenging. A rescue conducted last fall illustrates the professionalism and teamwork that U.S. Air Force crews bring to civilian search-and-rescue missions.

In this case, the Air Force Rescue Coordination Center relayed a Shoshone County SAR request at approximately 5 p.m. local time on Oct. 10, 2016. The tasked mission was to locate and recover a 74-year-old man who fell down a 1,200-foot ravine near Coeur D'Alene, Idaho, while hunting.

The pilots for the mission, Captains Erik Greendyke and John Harris, immediately began mission planning, while special missions aviator SSgt Joe Lopez prepared the aircraft and rescue equipment, and TSgt Amber Schumacher, an independent duty medical technician from the 336th Training Group, readied her quick response medical kit, flight gear, and radio. Despite a short delay due to a no-start on the UH-1N's second engine, the helicopter was in the air within an hour of receiving the call.

Once at the scene, the crew immediately located medical and SAR personnel on the ridge above the injured hunter. Because flight the crew did not initially have two-way radio communications with paramedics on the ground, they inserted Schumacher via hoist to coordinate with on-scene personnel and establish a common radio frequency.

After talking with the ground party on the ridgeline, Schumacher elected to hike down the near-vertical slope with her full medical gear to assess the severity of the victim's injuries. Once reaching the survivor, she found that she had to dig a platform out of the side of the steep hill in order to provide a stable surface to treat and extract the 300-pound (135-kilogram) victim.

With night approaching, the diminishing light made terrain and other hazards difficult to identify. However, the extreme brightness from the setting sun was its own hazard, killing the crewmembers' night adaptation as they flew reconnaissance over the survivor. Greendyke therefore donned his night vision goggles (NVGs) early in order to help ensure clearance from obstacles; the rest of the crew switched to NVGs after the sun set.

Because power margins were near zero, Harris and Greendyke made several practice approaches to confirm the best and safest path for delivering the Stokes litter. After the litter had been hoisted down and the victim prepared, the crew returned to extract the patient.

While Lopez hoisted the patient 100 feet up to the aircraft, Schumacher maintained positive control of the litter with a tag-line to prevent it from unsafe oscillations. Because of the patient's significant bulk, once he was at the aircraft, Lopez turned over control of the hoist to Greendyke in order to use both hands to pull the patient on board.

The crew flew away, circling back for another NVG hover in order to extract Schumacher. By this time, the aircraft was approaching minimum fuel, and the crew departed with the patient for the nearest hospital. There, Schumacher escorted the patient to the emergency room team and provided a patient brief, ensuring continuity of care.

Without the efforts of Harris, Greendyke, Lopez and Schumacher, the ground party would have risked serious injury, or worse, to themselves and the patient by attempting to move the critically injured hunter up the steep ridge. The crew's skill, professionalism and dedication helped ensure a successful outcome for everyone involved.

Regular hoist training at all altitudes prepares the 36th RQS for whatever rescue missions might arise.

The squadron's 18 civilian maintenance contractors, some of whom are assigned to individual helicopters, show great pride in keeping the aircraft serviced and ready to fly. The contractors all have many years of experience on helicopters in general and the UH-1N in particular, allowing them to quickly troubleshoot problems whenever they arise. These miracle workers ensure that day in and day out these Vietnam War-era aircraft never skip a beat.

THE CREWS

Capt John Harris, a pilot with the 36th RQS, explained how new pilots come through the USAF training pipeline before coming to the unit. "U.S. Air Force helicopter pilots begin their flight training in the single-engine T-6 Texan training airplane. Following their initial training, they are streamed into different aircraft based on their class rank and preferences. Pilots who are selected for helicopter training go to Fort Rucker, Alabama, to learn how to fly the TH-1H Huey. After about a year of academics and flight training, pilots then progress to graduate-level training at Kirtland Air Force Base in Albuquerque, New Mexico."

Harris continued, "Training at Kirtland typically lasts four to six months, after which pilots are "basic mission qualified." After arriving at their squadron, pilots will be trained further in their squadron's specific missions. At Fairchild, Huey pilots are qualified in parachute operations, water operations, SAR operations, rappelling, belly cargo sling operations, and performing maintenance check flights."

36th RQS pilots also receive additional training in high-altitude operations. As Capt Shane Densmore observed, "For a normal search-and-rescue mission, a flight crew consists of two pilots, one flight engineer/hoist operator, and flight medic. Add the rescue equipment, medical and personal gear, plus the potential of hoisting a patient up to 300 pounds, and we find the UH-1N needs to be to finessed considering its power limitations.

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WITH THE DEMAND FOR THEIR SERVICES LIKELY TO REMAIN STEADY, AND A NEW AIRCRAFT PLATFORM ON THE HORIZON THROUGH THE AIR FORCE'S UH-1N REPLACEMENT PROGRAM, THE 36TH RQS LOOKS TO HAVE AN INTERESTING FUTURE AHEAD OF IT.

"At low altitudes with a full crew and full gas, the Twin Huey doesn't exactly have excess power, in particular on hotter days. Once a flight starts climbing up to 7,000 feet or higher, the crew really needs to manage fuel and any additional carried weight and make sure the aircraft is within limits. Combine this with the potential of heavy winds in the mountains and a dark night using NVGs [night vision goggles] and a crew needs to be well trained and confident."

To instill that confidence, the 36th RQS has developed a mountain/high-altitude flight training course that teaches the unit's newly assigned pilots how to best operate in high-altitude environments during both day and night operations. According to Harris, the unit incorporated techniques and lessons learned from civilian and military flying courses in Alaska, Colorado and Canada into a program tailored for the squadron's operating environment. The training emphasizes the importance of crew resource management (CRM), power management, wind and weather analysis, and keeping escape routes when operating in confined mountain conditions.

"Our goal in our mountain course is not just to pass knowledge of power awareness, wind analysis, and good escape routes though — a big part of it is building confidence in mountainous terrain," Harris noted. "The more comfortable a pilot is and the more they fly in mountainous areas, [the more] they build confidence, so when it comes time for the rubber to meet the road and someone's life is on the line, they are confident about the situation and can use their skills and additional training obtained through the course we teach."

Working in close coordination with the two pilots is the special missions aviator (SMA), previously known as a flight engineer. As Staff Sgt Jeremy Burnite described his job, "The SMA calculates the helicopter's weight and balance, performance planning, preflight and through-flight inspections, [and] normal and emergency checklist procedures. The SMA also controls the rear cabin of the aircraft and helps in obstacle avoidance during low-level flight, hovering, and landing in confined areas.

"The SMA is the helicopter's rescue hoist operator, and works closely with the aircraft medic during hoist operations. The CRM process between the pilots and SMA is important, especially with the coordination for picking up a survivor in a confined area while in the hover. The SMA backs the pilots up with radio communications, fuel calculations, navigation, time management, and stays in constant communication with the pilots to maintain safety and CRM."

The medics who join the crews from the 336th Training Support Squadron are trained to the level of a civilian emergency medical technician (EMT) with additional training to military requirements. To join the 36th RQS, medics receive training in helicopter operations, including packaging and preparing survivors for hoist extractions using strops and Stokes litters.

The Air Force is moving forward with its UH-1N Replacement Program, although it has yet to select an aircraft type.

Overwater insertions are part of the SERE training.

A UN-1N performs a fast rope evolution.

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Considered to be fourth crew members, medics work closely with the SMA to clear the tail during confined area landings, and serve as another set of eyes during close-quarter mountain operations. This in addition to the work they do on the ground, assessing patients, providing them with initial medical aid, and preparing them for a pickup or hoist extraction.

SUPPORTING SERE

When SERE school is in progress, the 36th RQS deploys a helicopter about a 40-minute flight north of Fairchild to a forward operating base (FOB) near Cusick, Washington. From this base the helicopter is available 24/7 to perform support and provide evacuation if a student or instructor gets hurt and needs immediate transport to a medical center. A crew stays with the aircraft for six days, and then another crew comes in to replace them. Maintainers also rotate through a weekly stint at the FOB to ensure round-the-clock maintenance support for the aircraft.

The 36th RQS supports the SERE school in many ways. The squadron performs hoist extraction training with all students. It also practices fast-rope, rappel, and rope ladder operations with combat rescue officers from the survival school as well as with reserve pararescue specialists from Portland, Oregon.

Additionally, the squadron does emergency parachute employment demonstrations for students in order to simulate an aircrew member having to eject from an aircraft and prepare to evade enemy forces. Crews do these jump demonstrations from both a static line configuration (where the parachute is automatically deployed upon exiting the aircraft) at 1,500 feet above the ground; and from a military free fall (MFF) configuration at altitudes from 7,500 to 10,000 feet above the ground.

"Students receive detailed instruction about combat SAR operations, including how to contact and vector in helicopters for a pick up," Greendyke continued. "When we teach the students vectors, we fly about 300 feet above the ground and let them talk us on to their location where we would simulate their rescue.

"To add a new dimension for the students we will play the enemy aggressors and search for students while they try to evade us. We will fly about 50 feet above the trees and do turns during the search; we have found that this 'aggressor' work adds stress to the students and really makes them do their best to stay hidden while we are in the area."

During SERE training, the squadron will also run SAR scenarios in which a member of the 36th or the 336th TRG simulates that they are a survivor on the ground in need of a medical exfil from a remote mountainous area. The 36th will fly with a 336th medic on board, search for and locate the simulated survivor, drop the

Working with an internally carried rescue basket, a 36th RQS UN-1N heads to a lake for overwater training.

Mountain flying is a big part of what the 36th RQS does. Pilots with the squadron undergo specialized training to gain skill and confidence in mountain operations.

The 36th RQS Twin Hueys have internally mounted Goodrich hoists.

medic off to care for and package the simulated survivor, then the 36th crew will exfil the medic and the simulated survivor via either a landing or with their hoist.

When a SAR or medical flight in support of SERE personnel is requested, the 36th RSQ UH-1N will gather information about the patient and launch rapidly. If a student or instructor needs medical attention, the flight crews will insert medics virtually anywhere at any time of day or night. Injuries during SERE school can be range from ax or other cutting tool wounds to broken bones, dehydration or hypothermia. Most patients are transported to Sacred Heart Medical Center or Deaconess Hospital in Spokane.

CIVILIAN RESCUES

The 36th RQS also supports the National Search-and-Rescue Plan by conducting SAR and medical evacuation missions in a four-state region, from the Cascades in Washington, down to Oregon, over to the Rockies in Western Idaho and Montana. SAR missions are conducted both day and night, often at high altitudes in treacherous mountain terrain, including areas completely inaccessible by ground vehicle. The unit's unique capabilities can often spell the difference between life and death for lost or injured hikers, hunters, skiers and snowboarders.

Requests for assistance typically start with a 911 call to law enforcement from the injured party or a witness. Before the 36th RQS is contacted, all other civilian assets are requested. If none of these helicopters are available or able to perform the mission, the request moves up to the Air Force Rescue Coordination Center (AFRCC). The AFRCC maintains a database of military rescue units and associated capabilities. Once the AFRCC confirms no other civilian assets are able or available to meet the SAR request, the AFRCC will request SAR support from the most suitable wing.

If the wing commander agrees to accept the request, the wing commander will then task his or her squadron with the SAR mission. As the 36th falls under the 58th Operations Group at Kirtland AFB, New Mexico, ultimately its tasking for a civilian SAR will come from the 58th Special Operations wing commander.

In previous years, the 36th RQS would receive about 10 civilian callouts per year, but over the last few years that number has decreased to around five, thanks to an influx of civilian rescue helicopters such as Montana-based Two Bear Air. When the 36th RQS is called out, it's almost always for a hiker or hunter who was injured or lost in an extremely remote area *(see sidebar, p.44)*. More often than not, these rescues are high-altitude, technical hoist rescues in the Cascades or Rockies, with summertime density altitudes sometimes reaching over 11,000 feet.

With the wide spectrum of missions asked of them, and the wide range of weather conditions in which they fly year-round, the flight crews of the 36th RQS have their work cut out for them. With the demand for their services likely to remain steady, and a new aircraft platform on the horizon through the Air Force's UH-1N Replacement Program, the 36th RQS looks to have an interesting future ahead of it.

Skip Robinson | Skip has covered helicopter operations through photography for 25 years and has worked with *Vertical* Magazine for over a decade. His main interests are rescue, parapublic and military operations. Skip is based in Los Angeles, California.

A rescue swimmer gives the thumbs up to the winch operator during a training exercise off the coast of Catania, Sicily, the home of Guardia Costiera's 2° Nucleo Aereo.

Saving Lives in the Mediterranean

Based in Catania, Sicily, the Italian Coast Guard's 2° Nucleo Aereo is playing a critical role in the central Mediterranean migrant crisis.

Story by Elan Head | Photos by Lloyd Horgan

There are three principal routes taken by refugees and migrants who cross the Mediterranean Sea in an attempt to reach Europe.

There is the Eastern Mediterranean Route from Turkey to Greece — a route that has been taken by many asylum seekers fleeing violence and instability in Syria, Afghanistan, and Iraq. There is also a Western Route between Morocco or Algeria and Spain, which has been used by Syrian as well as African refugees, although generally in much smaller numbers.

Then there is the Central Mediterranean Route, which leads to Italy. Migrants and refugees who take this route might depart from Algeria, Tunisia, or Egypt, but in recent years the vast majority have departed from Libya.

In 2012, at the onset of Libya's political crisis, there were just over 15,000 documented arrivals in Italy via the Central Mediterranean Route. Last year, according to the United Nations Refugee Agency, there were more than 180,000. Another 4,500 people are known to have died while attempting to cross the central Mediterranean — a fatality rate of about one in 40.

Most of the refugees and migrants who take the Central Mediterranean Route are from African countries including Nigeria, Eritrea, Guinea, and Côte d'Ivoire. Many begin their journeys as

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With two additional aircraft ordered last year, Guardia Costiera now has a fleet of 12 Leonardo AW139 helicopters, half of which are currently based in Catania.

economic migrants with the goal of making a better life for themselves, or supporting their families back home.

However, the collapse of the Libyan state has been associated with a dramatic increase in human trafficking. According to the International Organization for Migration (IOM), migrants are now typically held hostage upon their arrival in Libya and forced to pay a ransom. Those who can't pay become involuntary laborers, slaving for their captors for several months to a year.

The risks can be even greater for women. The IOM estimates that 80 percent of Nigerian women who arrive in Italy by sea are victims of sex trafficking. Some young girls are trafficked from the beginning of their journeys; others turn to prostitution when they run out of money. Even women who travel with their husbands can be raped systematically at every stage of their journeys, with many women falling pregnant as a result.

By the time these migrants are packed onto cheap boats on Libya's northern shores, sometimes at gunpoint, "they have most likely experienced violence, abuse, and torture; [been] sold into slavery in Libya, sometimes multiple times; and lived in a constant state of fear," the IOM observes. Yet with their embarkation to Italy come new, terrifying risks.

Chief among these is the risk of drowning, with boats frequently capsizing in bad weather or during rescue attempts. But some migrants asphyxiate from breathing engine fumes, or are crushed to death on boats that are massively overloaded. Others suffer chemical burns when gasoline leaks in the boat and mixes with sea water.

The journey across the Mediterranean is thus a uniquely vulnerable time for migrants, even those who have spent a year or more at the mercy of smugglers and traffickers. Yet it is also the point at which the governments and humanitarian organizations of Europe are best positioned to help.

The circumstances that enable human trafficking — political instability, corruption, and a lack of economic opportunities — are big, hard problems that are impossible for any single person to fix. But the straightforward act of saving a life, of aiding another human being in their time of greatest need, is where one person, or one flight crew, can still make a difference.

In the central Mediterranean, one of the organizations making a difference is the Italian Coast Guard, Guardia Costiera, and within it the 2° Nucleo Aereo based in Catania, Sicily. In November of last year, *Vertical 911* traveled to Catania to learn how the air unit is managing its role on the front lines of the migrant crisis.

THE AIRCRAFT

Catania is located halfway down the east coast of Sicily, the triangular island that sits just off the toe of the boot-shaped Italian mainland. On clear days, the city is dominated by the looming presence of Mount Etna, although this active volcano is so high — climbing from sea level to around 10,920 feet (3,330 meters) — that its top is often shrouded in clouds.

Guardia Costiera has a maritime base at the Port of Catania, near the city's center. Its 2° Nucleo Aereo is based a short distance southwest of the city at Catania Fontanarossa Airport, a bustling mid-sized airport that sees nearly 8 million passengers per year.

Guardia Costiera commenced aviation operations in the late 1980s, originally with Piaggio P.166 airplanes, later adding the P.180 Avanti II. Today, its primary maritime patrol airplanes are three twin-turboprop ATR 42s, one of which is based in Catania.

The ATR 42s are equipped with radar, an electro-optic/infrared (EO/IR) camera, and other sensors for surveillance and pollution detection, which are operated by two systems operators who sit at a bank of monitors toward the front of the cabin. At the rear are two large bubble windows for visual observation, and each aircraft also has a high-intensity searchlight that aids in search-and-rescue (SAR) missions.

Guardia Costiera's helicopter operations began in 1993 with the delivery of its first Agusta-Bell 412. Rotorcraft capability quickly became essential to the coast guard, which eventually grew its fleet of 412 helicopters to 10 (one of which was tragically lost in a fatal accident in 2001).

The 412s served admirably in SAR and other missions for many years, but when Guardia Costiera began to renew its fleet in 2010, it opted for the AgustaWestland (now Leonardo Helicopters) AW139. The coast guard has now fully replaced its 412s and last year ordered two additional AW139s, bringing the total AW139 fleet size to 12.

"The AW139 gives us a lot more capabilities for search-and-rescue," said SAR captain and instructor pilot Giovanni Ligas, who is one of a dozen Guardia Costiera helicopter pilots based in Catania. "We do rescues with the 139 we never could have done before."

Guardia Costiera's AW139s are night vision goggle (NVG) capable and have a full suite of mission equipment including search and weather radar, marine band and satellite communication systems, a high-definition forward-looking infrared/low-light TV (FLIR/LLTV) system, optical proximity light detection and ranging (LiDAR) system, and mission console with high-definition displays.

Each aircraft also has an external rescue hoist, cargo hook, new-generation Trakka searchlight, emergency flotation system, and external life rafts. Although the standard AW139 maximum takeoff weight (MTOW) is 6,400 kilograms (14,110 pounds), the coast guard has been able to upgrade some of its aircraft to the optional 6,800 kg (14,990 lbs) MTOW, and its newest aircraft to the latest increased MTOW of 7,000 kg (15,430 lbs).

In addition to the 2° Nucleo Aereo in Catania, Guardia Costiera helicopters are currently stationed at two other bases in Italy. Since the advent of the current migrant crisis, however, the coast

A rescue swimmer leaps from the AW139 into the ocean below during a training exercise.

According to new first officer Tommaso Fonte, "For every pilot I think the best thing is flying and saving lives. It's what every pilot wants to do."

Guardia Costiera's AW139s are equipped with Breeze-Eastern electric rescue hoists. The helicopters' elongated noses contain weather radar.

guard has shifted more of its resources to the Mediterranean. Fully half of its AW139s are now based in Catania, where one helicopter is always on standby, and several aircraft might be flying at any given time.

READY FOR THE CALL

Guardia Costiera's helicopters have a basic SAR crew of five: two pilots, a hoist operator, a SAR technician, and a rescue swimmer. For medical evacuations, the aircraft also carry a doctor.

In the central Mediterranean, most migrant rescues are conducted by vessels due to the large numbers of people involved, with the AW139s called into evacuate only the most seriously ill or injured patients. The doctors for these missions are provided by a humanitarian organization, CISOM (Il Corpo italiano di soccorso dell'Ordine di Malta). Although the doctors undergo familiarization training to fly on the helicopters, they are not official members of the Guardia Costiera crews.

Pilots typically accomplish their primary helicopter flight training in the United States through an arrangement with the U.S. military. Then, upon their return to Italy, they undertake an extensive course of ground, simulator, and flight training to transition to the AW139. New pilots gain mission experience by flying second-in-command, gradually working their way up to command pilot status as they gain operational experience.

In addition to the pilots and rear crew, a maintenance specialist often flies with the AW139 on longer missions, or missions away from base. There are 15 maintenance specialists based in Catania, at least two of whom are on duty at any given time. Routine maintenance is performed at the base, with heavy maintenance and more comprehensive inspections handled by Leonardo at its facilities in Rome or Cascina Costa.

When a vessel is in distress in the waters surrounding Italy, calls for help are directed through the national Maritime Rescue Coordination Center (MRCC) in Rome, or one of 16 Maritime Rescue Sub-Centers (MRSCs), one of which is located in Catania. Typically, requests for air support are coordinated through the MRCC in Rome.

When an air asset from Catania is required, the MRCC sends an order to the commander on duty, who is responsible for assigning a specific crew to the mission. Although one aircraft and crew are on standby at all times, the aircraft schedule changes constantly, so the crews "have to stay flexible," as pilot Salvatore Provenzano put it.

From the time the call for help comes in, crews can usually be ready to go within 30 minutes, including all flight planning time. Although many medevac missions are relatively routine, crews must be prepared for anything — because the most difficult call of their careers could come at any time.

One such call came in the early morning hours of Dec. 28, 2014, when a fire broke out on the car deck of the Norman Atlantic, a

Regular washes are essential maintenance for aircraft operating in a corrosive saltwater environment.

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The cockpit of the AW139.

On the ramp at the 2° Nucleo Aereo base at Catania Fontanarossa Airport.

The view out the bubble window of the ATR 42.

Many of the unit's missions take place at night.

The Guardia Costiera's AW139s are fully equipped for night vision goggle operations.

The hoist operator surveys the area for any dangers before clearing the rescue swimmer to the door.

passenger ferry with more than 450 passengers and crewmembers on board.

Although the vessel was in Greece's search-and-rescue region near the island of Corfu when the captain radioed for help, the MRCC in Rome assumed coordination of the rescue operation. Guardia Costiera immediately deployed its available air assets: an ATR 42 from Pescara, in northern Italy, and two AW139 helicopters from Catania (later supplemented by a second ATR 42 and third AW139).

The Italian Navy also responded in force, eventually sending a total of seven helicopters to the Norman Atlantic: five AgustaWestland (now Leonardo) EH101s (AW101s), an NH Industries SH-90, and an Agusta-Bell 212. (A Hellenic Air Force AS332 was also involved for part of the rescue operation.) Immediately, the helicopters that were first on scene began winching people from the Norman Atlantic onto the deck of the Italian ferry Cruise Europa, which was one of the first and largest vessels to arrive at the site of the disaster.

Complicating the already daunting operation was extremely bad weather, including turbulence and winds up to 50 knots, low ceilings, poor visibility exacerbated by smoke from the fire, and a rough sea that caused the Norman Atlantic to drift a substantial distance from its original location. Nevertheless, the Guardia Costiera ATR 42 crews managed to successfully coordinate the diverse helicopters on scene, resulting in one of the largest helicopter rescue operations in history.

A basic SAR crew consists of two pilots, a hoist operator, a SAR technician, and a rescue swimmer.

A rescue swimmer is lowered from the AW139 during a training exercise at a small airfield.

The hoist operator reaches out to grab the rescue swimmer as he is brought back up to the aircraft.

"It was very well coordinated with our people," said pilot Giovanni Ligas, who commanded one of the three participating AW139s. Of the hundreds of Norman Atlantic passengers and crewmembers who were evacuated from the burning vessel, 45 of them were saved by Guardia Costiera helicopter crews, who flew a total of 34 hours in 16 missions over two days. A display at the 2° Nucleo Aereo base in Catania commemorates their extraordinary efforts — an example of the lengths to which these crews are prepared to go at a moment's notice.

THAT OTHERS MAY LIVE

For migrant rescues Guardia Costiera's ATR 42 crews provide the same overwatch and coordination services that proved essential during the Norman Atlantic rescue.

Some rescues are initiated when a migrant boat calls for help directly using a satellite phone; others, when a boat is spotted by a nearby vessel. Once an order for air support is received in Catania, an ATR 42 crew will fly to the location of the boat in distress and monitor the situation from the air while coast guard or other vessels come to the boat's aid.

Guardia Costiera's ATR 42s are stocked with emergency life rafts that, when necessary, can be dropped from the aircraft using a specially designed slide. However, this option is avoided during migrant rescues unless absolutely necessary — crews are mindful that deploying life rafts could spark panic on the overcrowded boats, potentially leading to more drownings.

Helicopters are often called to conduct medical evacuations once victims have been transferred onto rescue vessels and found to be in need of critical care. During Vertical 911's visit to Catania, an AW139 crew was called out to winch a patient from a coast guard ship that was carrying rescued migrants toward Italy's southernmost island, Lampedusa. Located about 170 kilometers (105 miles) southwest of Sicily, and only about 110 kilometers (70 miles) from Tunisia, the tiny island of Lampedusa has been a primary point of entry for many African migrants, and the focus of much attention in the current crisis.

Today's migrant crisis is not the only one in Guardia Costiera's recent past — in 1991, waves of migrants began arriving in Italy from Albania following the collapse of that country's communist regime and ensuing economic crisis. Then as now, the coast guard found itself on the front lines of a complex, politically charged situation with no simple or obvious solution.

With conflict in Libya ongoing, it is not clear how the current migrant crisis in the central Mediterranean will be resolved. According to the IOM, more than 24,000 migrants arrived in Italy by sea in the first three months of 2017 — a 23 percent increase compared to the same period in 2016. On a single weekend in April of this year, more than 8,000 migrants were rescued off the Libyan coastline by Guardia Costiera, humanitarian rescue ships, and other vessels.

That's an overwhelming volume of rescue work for any organization to tackle, and as a relatively small air unit with limited resources, Guardia Costiera's 2° Nucleo Aereo can only do so much. But whether on a fair-weather medevac mission, or a demanding nighttime rescue in gale-force winds, the unit's crews approach their daunting work with dedication and professionalism, doing credit to the rescuers' motto "that others may live."

Elan Head | An award-winning journalist, Elan is also an FAA Gold Seal flight instructor with helicopter and instrument helicopter ratings, and holds commercial helicopter licenses in the U.S., Canada and Australia. She can be reached at elan@mhmpub.com.

A rescue swimmer on a night mission. Guardia Costiera crews know that the most important call of their careers could come at any moment — including at night or in bad weather.


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Hovering in front of Chatterbox Falls, SAR Techs Sgt Dan Verret and Sgt Ron Barrow are hoisted back up to the Cormorant. Based in Comox, British Columbia, 442 Transport and Rescue Squadron operates five CH-149 Cormorant helicopters.

STANDING ON GUARD

Test pilot Rob Erdos gets behind the controls of the CH-149 Cormorant, Canada's search-and-rescue variant of the Leonardo Helicopters AW101.

By Robert Erdos | Photos by Mike Reyno & Heath Moffatt

442 Squadron's five CH-149 Cormorants help cover a search-and-rescue territory comprising 1.4 million square kilometers (over 540,000 square miles) of rugged land and water.

The victim went canoeing, we were told during the simulated mission.

Later that day, a neighbor on the northwest shore of nearby Lasqueti Island, British Columbia, saw the canoe floating upside down and alerted the police.

This fictional scenario is the sort of civil emergency that is a typical tasking for Royal Canadian Air Force (RCAF) search-and-rescue (SAR) crews. In this exercise, which took place at 442 Transport and Rescue Squadron's home base at 19 Wing Comox, British Columbia, a CH-149 Cormorant helicopter was tasked to conduct a search. *Vertical 911* was invited to fly along as cockpit crew to participate in a realistic SAR mission.

The tasking was simulated but the flight was very real, and it would showcase the impressive capabilities of the RCAF's primary SAR helicopter.

When an actual tasking is received during working hours, the announcement, "Standby crew to operations," resonates through the 442 Squadron hangar. It was a nostalgic sound for the author, a former air force SAR pilot who proudly flew the CH-113/A Labrador helicopter on similar missions, albeit several decades ago. Returning to Comox was a wonderful opportunity to see how advancing technology has changed the serious business of search-and-rescue.

442 Squadron provides coverage for the Victoria Search and Rescue Region (SRR), comprising over 1.4 million square kilometers (540 square miles) of mountainous British Columbia and Yukon Territory and extending about 1,100 kilometers (685 miles) into the Pacific Ocean.

It is one of few units in the RCAF that operates multiple types, and is both a SAR unit and the Operational Training Flight (OTF) that teaches pilots to fly both the CC-115 Buffalo and the Cormorant helicopter. The squadron currently has five CH-149s.

The long-in-the-tooth Buffalos are due to be replaced by the recently selected Airbus C295W fixed-wing transport plane, although the "Buffs" will likely soldier on for several more years.

442 Squadron's SAR taskings are managed by the Joint Rescue Coordination Centre (JRCC) in Victoria, British Columbia. There are about 3,000 calls for SAR assistance per year in the Victoria SRR. Missions range widely from civil medevac to marine and aviation rescue. Crews hold a 30-minute standby posture during the day, with a two-hour alert during nights and weekends.

MEET THE CORMORANT

First impressions of the Cormorant are of complexity: five-bladed rotor, three engines, retractable undercarriage, and a comprehensive automatic flight control system (AFCS). In lieu of high-level

systems integration, the cockpit seemed very “1990s,” festooned with banks of levers, switches, knobs or buttons for every system.

A similarly complex aircraft management system (AMS) controls all of the onboard digital systems, including communications, navigation, engine/performance instruments, and health monitoring. The AMS interface seemed very keypad intensive. My inquiries about its usability among squadron pilots were met with polite grumbles. In addition to the integrated avionics, a Garmin GPS 500 navigation system was retrofitted a few years ago to provide for en route and approach instrument flight capability.

The three General Electric T700-T6A1 engines, each rated at 2,145 shaft horsepower, have a turbine inlet temperature and gas producer speed limiter, but no torque limiter. Most of the time, torque doesn’t seem to be a concern. An auxiliary power unit provides backup electrical power and bleed air for engine starting and cabin environmental control.

The Cormorant is equipped for flight into known icing conditions, an invaluable capability which facilitates deployments over the rugged mountains of the province. Anti-icing a helicopter is far from simple, involving electrical heater mats in the five main rotor blades, four tail rotor blades, engine intakes, bleed air to the engines, electrically heated windscreens, pitot tubes and engine/gearbox drains.

The normal SAR fuel load is 2,400 kilograms (5,290 pounds), burning a nominal 800 kg (1,765 lbs) of fuel per hour. When required, the maximum fuel load is about 4,225 kg (9,315 lbs), providing a cruise endurance of about 4.5 hours.

The cabin crew includes two SAR Techs and a flight engineer who work very closely together.

Despite its size, author Rob Erdos found the Cormorant to be very stable in the hover.

The Cormorant is more agile than its predecessor, the CH-113 Labrador, and is capable of a stable precision hover.

The cockpit of the Cormorant is festooned with banks of levers, switches, knobs or buttons for every system.

The Cormorant has proven to be well suited for high-altitude missions in the British Columbia mountains.

As both a SAR unit and the Operational Training Flight, 442 Squadron teaches pilots to fly both the CH-149 Cormorant and the CC-115 Buffalo.

'STANDBY CORMORANT CREW TO OPERATIONS'

My chance to fly the Cormorant came with the SAR standby crew. Aircraft commander Capt Dan Cunningham is a two-tour Cormorant pilot who previously flew the CH-113/A Labrador. He assembled the crew across the map table in the squadron operations center to brief our overturned canoeist search scenario.

The remainder of the crew consisted of the author (pretending to be a qualified co-pilot), flight engineer MWO Jim MacDougal and SAR techs Sgt Ron Barrow and MCpl Fred Bernier. The co-pilot, Capt Jeff Barth, kindly let me take his seat with the understanding he would quickly evict me if the crew was tasked for a real mission.

In a real SAR launch, the standby aircraft commander will speak to the JRCC to get the details and confirm that he can accept the tasking. If so, things begin to move quickly. The flight engineer (FE) and co-pilot run outside, start the helicopter and perform preflight checks. The aircraft commander does the mission planning: weather, routing and fuel requirements. He gets input from the SAR tech team leader about equipment requirements and the most effective means of searching. In our case, they decided upon an initial shoreline search followed by a 500-foot creeping-line-ahead search pattern with one-half mile spacing.

Such decisions are based upon the last known position of the victim, prevailing visibility, plus the influence of winds, currents and tides. This is where experience and local knowledge are critical. Survival times in the cold ocean water can be severely limited. Had this been a real tasking, the crew would have been airborne in minutes.

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THE PULSE OF THE HELICOPTER INDUSTRY

When required, the Cormorant's maximum fuel load is about 4,225 kilograms (9,315 pounds), providing a cruise endurance of about 4.5 hours.

Given that our rescue mission was simulated, I took the opportunity to familiarize myself with the Cormorant at a small runway at Texada Island, adjacent to the search area. Nosewheel steering is controlled by a left-right toggle switch mounted on the cyclic. Taxi speed is controlled by collective. Lifting into a standard 10-foot hover required application of brakes, collective to 30 percent torque, then coordinated power and aft cyclic to lift the nosewheel. The Cormorant hovers at six degrees nose-up pitch, but the field of view was quite satisfactory.

Hover power out-of-ground-effect (HOGE) was 87 percent at our operational SAR weight of 13,800 kilograms (30,425 pounds), with a standard fuel load of 2,400 kg (5,290 lbs). This loading put us 765 kg (1,685 lbs) below the maximum allowable gross weight of 14,600 kg (32,185 lbs).

I found the Cormorant significantly more agile than the Labrador, although the old Lab had the maneuverability of a tractor. The Cormorant was also considerably more stable in the hover. The standard mode of the AFCS is an attitude command model, appropriate for such a large machine, which simplified precision hovering to occasional small inputs.

A slight tendency for lateral pilot-induced oscillations was noted when performing a very tight hover. I took it as a signal to relax, and the symptoms disappeared. A collective trigger was required to release the collective magnetic brake. The heading hold system was smooth and precise, blending into a turn coordination function above 60 knots, and making pedal inputs unnecessary when not actively maneuvering. It takes some getting used to, but most Cormorant pilots fly with their feet flat on the floor, only lifting them to cover the pedals when required. Pedal micro-switches release heading hold when they sense a five-pound force.

The engines are governed through dual digital engine control units (DECUs), which are functionally equivalent to the now-ubiquitous full authority digital engine control (FADEC), but with mechanical components. In the interest of testing the governor,

SAR Techs perform a double-up hoist.

I applied a series of collective ramp inputs at various rates, and never saw the rotor speed budge. The torque rise was smooth and predictable, without evident overshoot.

Approaching the hover from a circuit pattern, my attention was captured by intense vibration as we passed through translational lift. Airspeeds between roughly 35 and 15 knots are reminiscent of a ride in a paint shaker, with transient vibrations that made my eyeballs shudder. A prompt deceleration to hasten passage through translational vibrations is the recommended technique. I can see why the Cormorant has an active control of structural response vibration reduction system.

RESCUE IN PROGRESS

Cunningham reminded me that we had left our imaginary canoeist-in-distress patiently bobbing in the Strait of Georgia.

The coordinates for our search pattern had been entered into the AMS, and it was an easy process to couple the AFCS to fly the search pattern, leaving the entire crew free to search for

> **“THE CORMORANT BROUGHT A LOT OF NEW TECHNOLOGY TO THE SAR BUSINESS, BUT THE BASIC MISSION, LIKE THE MOUNTAINS AROUND US, WAS UNCHANGED.**


Sgt Dan Verret is hoisted up to the Cormorant.

Erdos found the Cormorant to be far more capable than the CH-113 Labrador he flew during his own time as a SAR pilot.

In the Cormorant, “one engine inoperative” means you only have two engines left — a terrific improvement in peace of mind over its predecessor, the twin-engine CH-113/A Labrador.

our buoyant imaginary canoeist. Had we spotted him, a waypoint could be overlaid upon his position, and the AFCS Transition Down feature could be engaged to bring the Cormorant to a hover. SAR crews appreciate the coupled transition and hover capability, although they are currently only authorized to use it over water.

Owing to time constraints, we abandoned the overwater search and headed up into the beautiful Vancouver Island hills for a confined area landing. Cunningham read out the pressure altitude and outside air temperature, and the FE referred to paper charts pasted to a cabin bulkhead to determine the power available, utterly confusing me with the report that, "The engines make 120 percent which is equivalent to 80 percent. Our reject height is 70 feet and the fly-away height is 90 feet." Huh?!

Cunningham explained that while the all-engines operative 30-minute engine power limit is 106 percent, the one-engine inoperative (OEI) power limits increase to 125 percent for 2.5 minutes, or perhaps less if the engine is limited by turbine inlet temperature or RPM. That's the first number that the FE specified: 120 percent for current conditions. Then, if an engine were to fail, the two remaining engines could produce two times 120 percent, which is like having 240 percent power. While all of the engines are running, the OEI power is equivalent to "two times 120 percent divided by three," or 80 percent.

Got it? I can't imagine why I ever found it confusing.

In practice, this math exercise tells the crew that once they exceed 80 percent power on the approach they are using more power than can be sustained on two engines should one fail, and need to have an alternative plan: fly away or land.

THE SAME, ONLY BETTER

Recalling my SAR experience in the CH-113/A Labrador, so many years ago, we had approached mountain flying with extreme conservatism because the Labrador was grossly underpowered. Even under the best conditions, when an engine failed in the Labrador things quickly became dire. In the Cormorant, "OEI" means you only have two engines left — a terrific improvement in peace of mind.

As if to simulate rushing our hapless canoeist to hospital, we set power for maximum allowable airspeed during the return to Comox. At 500 feet above ground level on a 14 C day, the Cormorant achieved a respectable 142 knot indicated airspeed with 89 percent mast torque.

Flying the Cormorant was heavy with personal nostalgia. It had been 26 years since I left 442 Squadron as a pilot on the venerable Labrador. The Cormorant brought a lot of new technology to the SAR business, but the basic mission, like the mountains around us, was unchanged.

Flying SAR was still a matter of cautious and skillful flying, using maps and looking out the window. The Cormorant mission was just like the Labrador's mission before it, except that the newer machine is faster, flies farther, carries more, is easier to handle and isn't crippled by icing.

OK, a lot has changed.

Editor's note: This story previously appeared in the July-August 2016 issue of Skies Magazine.

Rob Erdos | Rob is a contributing editor for *Skies* magazine. He is a graduate of the U.S. Naval Test Pilot School and a professional test pilot. Also an aviation enthusiast, his spare time activities include displaying vintage airplanes and flying his RV-6 kitplane.

THE STAKES ARE HIGH

Rescuers have suffered fatal falls during all phases of rescue hoist operations. Rescue organizations can take an active role in preventing these fatalities by incorporating crew resource management (CRM) into hoist training.

The goal of CRM is to "improve air safety using all available resources." It is most effective when the entire crew works together. I have observed some units conducting rescue hoist training without involving the pilots. This leaves the hoist operators and rescuers to coordinate actions on their own. Doing so discounts the pilots' experience and knowledge of aviation safety procedures. Tap into those resources and involve the entire crew in hoist procedures!

The Snohomish County Helicopter Rescue Team, based in Washington state, has an overland rescue mission. We review hoist procedures based on lessons learned from mission debriefings, after action reports (AARs), and National Transportation Safety Board (NTSB) accident reports. Our emphasis is on standardization, use of checklists, training, communication, and situational awareness. Here's a closer look at some of those areas of focus.

STANDARDIZATION

The way a team trains is the way they will perform on a mission. We standardize all procedures and equipment, and then correct errors made during training to match the established standard. These standards are adjusted at times based on lessons learned.

CHECKLISTS

We use checklists habitually. The rescuers check each other's harness security, equipment, and radio function using a Rescuer's Safety Checklist prior to flight. The crew chief's harness is also safety checked for security.

Just as we read the aircraft checklist during aircraft run-up, the Hoist Ops Safety Checklist is read before all hoist operations. The non-flying pilot reads the safety checklist and the crew chief responds using the "call-response" method. For example:

Non-flying pilot reads: "Crew chief tether secure"

Rescuer checks that the crew chief tether is secured to the crew chief harness and to the aircraft anchor point, verifies that both carabiner gates are locked, then gives a thumbs up to the crew chief.

Crew chief responds: "Check"

We ensure everyone is tethered to the aircraft before take off. The crew chief harness is double-checked before they step out onto the skid. The crew chief double-checks the rescuer connections prior to bringing them out the door using the hoist. Rescuers double-check all connections prior to being raised or lowered on the hoist.

Reading the checklists out loud involves the entire aircrew and contributes to crew coordination.

The Snohomish County Sheriff's Office shares how it has used crew resource management concepts to help prevent helicopter rescue hoist fatalities.

By Bill Quistorf

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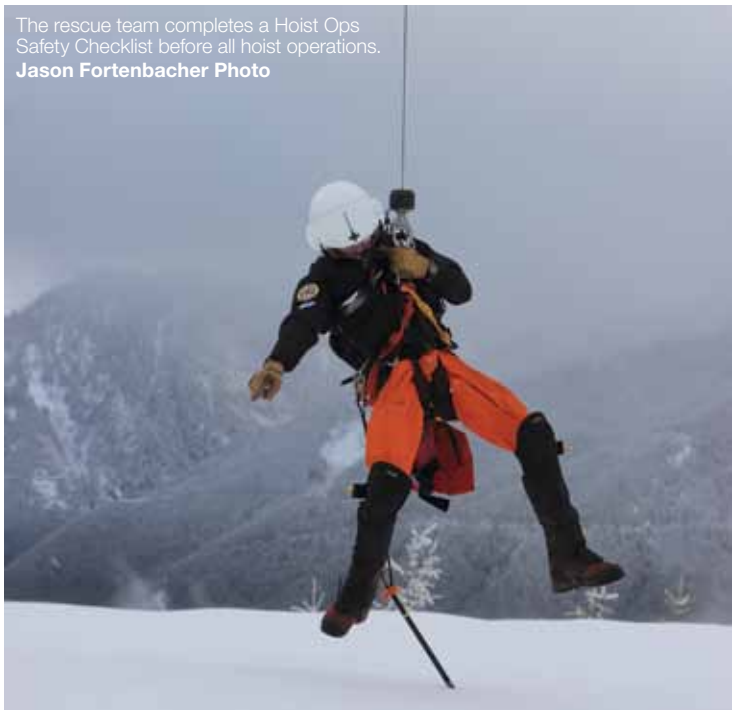
Based in Washington state, the Snohomish County Sheriff's helicopter rescue team regularly performs search-and-rescue missions in the rugged, high-altitude Cascade Range. Regular, standardized training is essential to performing these missions safely.
Skip Robinson Photo

Snohomish County's primary rescue ship is "SnoHawk 10," a former U.S. Army Bell UH-1H that has been heavily modified for its rescue mission. **Jason Fortenbacher Photo**



The rescue team completes a Hoist Ops Safety Checklist before all hoist operations. **Jason Fortenbacher Photo**

I know of a crew chief who stood out on the skid while conducting in-flight hoist training. When training was complete, he realized his tether was not attached to the anchor point. A checklist would have helped to avoid this situation, which easily could have led to a fatal accident. The stakes are extremely high when you skip a safety check!

SAFETY PROCEDURES

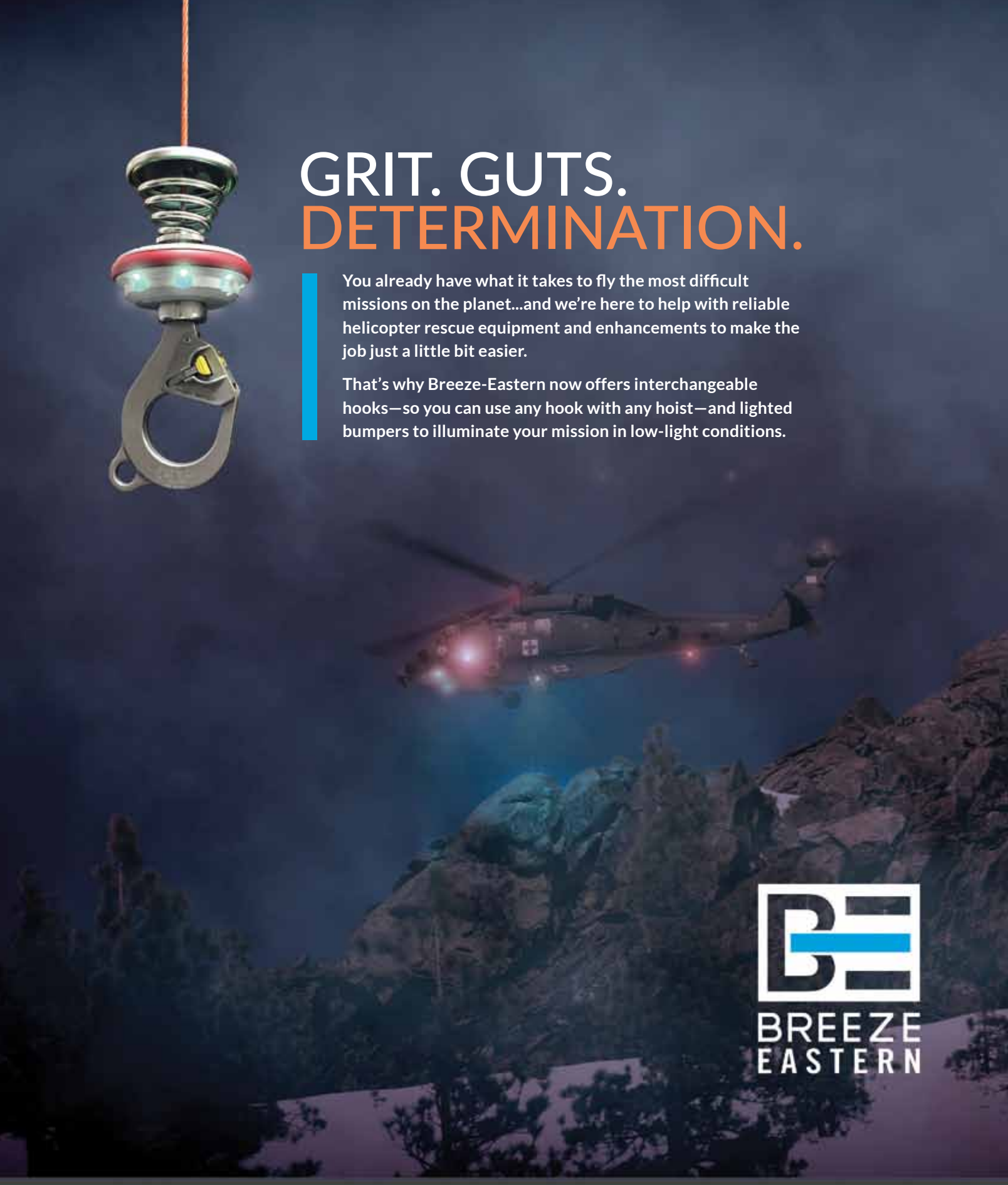
Let everyone know to speak up if they see anything unsafe. One should not assume someone else on the crew sees the same problem.

Part of our pre-flight briefing includes: *"If anyone is uncomfortable with the operation, say 'Abort' and we will abort the operation."* If we hear "Abort" everyone stops the operation until we all know what the problem is and can address it before we proceed.

EQUIPMENT CHECKS

Hoist cables, hoist hooks, and rescue harnesses are cleaned, inspected, and replaced periodically based on condition or service life. Rescue strops must have safety crotch straps secured to prevent subjects from slipping out of them, especially if the victim should pass out and go limp.

We use locking hoist hooks and locking carabiners for all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Ground rehearsals provide additional repetitions for the crew and help verify the standardization of procedures. **Jason Fortenbacher Photo**

During hoist operations, crew chiefs help “paint the picture” for the pilots up front by narrating what is going on. **Skip Robinson Photo**

live loads. I’ve discovered some aircrew members using non-locking carabiners or snap hooks on tethers attached to aircraft anchor points in the past. These connections can become disconnected in a “forced roll-out” situation. Colored tape gives locking carabiners a specific color code so they are easy to recognize.

TRAINING AND REPETITIONS

Initial training is critical. This is when we reinforce standard procedures. Repetitions build muscle memory. Many repetitions allow the beginner to become capable and comfortable with the procedures. Repetitions keep experienced individuals proficient in their tasks.

GROUND REHEARSALS

We conduct a series of hoist rehearsals on the ground before every training flight. This ensures that the crew conducts more repetitions. The pilots supervise the ground rehearsals to verify procedures are standardized. We rehearse the procedure until everyone is satisfied with the team’s performance.

Usually in the beginning of the rescue season, the rescuers run through one rehearsal prior to launching on a rescue mission. As the season progresses, the teams get more hands-on experience. We can then decide whether to conduct a ground rehearsal given the recent experience of that team.

COMMUNICATIONS

Basic hand signals are used throughout the hoist operation.

The rescuers are in radio contact during hoist ops. Rescuers make few radio calls during day operations, but more are needed for night ops. We use a dedicated radio channel for hoist operations. The pilot on the controls listens only to the crew chief and the rescuers. The non-flying pilot controls the radios and monitors external radio traffic.

Once the victim and rescuer are ready for extraction, rescuer "A" safety checks the hoist connection of rescuer "B," then gives a thumbs up. Rescuer A announces on the radio: *"Safety check complete, ready for raise!"* and gives the hand signal for raise.

Rescuer B does a safety check of all the subject's connections and makes the same radio call and hand signal prior to extraction. Finally, rescuer B does a self-safety check and goes through the same procedures. These radio calls give the pilots and crew chief assurance that the rescuer or subject is securely attached to the hoist hook and the connections have been verified each and every time.

SITUATIONAL AWARENESS

Our crew chiefs talk a lot! They "paint the picture" for the pilots up front. Even though pilots cannot see the rescuers, they know exactly what is going on based on the crew chief's narration during the operation. Our situational awareness is greatly improved based on this feedback. This awareness is backed up with a hoist camera and cockpit monitor. Still, the crew chief is the pilot's primary source of information.

DEBRIEFINGS AND AFTER ACTION REPORTS

The pilot-in-command (PIC) conducts a debriefing after each training flight and rescue mission. The team brings up and discusses any issues. Issues brought up during debriefings have led us to adjustments in our procedures over the years. PICs write AARs for rescue missions based on these debriefings. AARs help the rest of the team learn what took place and what needs improvement.

We can all learn lessons from NTSB accident reports. Fatal falls have occurred during both hoist insertions and extractions. None of us want to read about yet another fatality, let alone experience one. Use CRM to involve your entire crew in hoist training and operations. Distribute written AARs to ensure everyone in your organization is aware of issues that need follow-up action.

By adding pilot supervision and a few extra safety procedures to your rescue hoist training, you could very well prevent another rescue hoist fatality. The stakes are too high to do otherwise!

Bill Quistorf | Bill Quistorf is chief pilot of the Snohomish County Sheriff's Office and a former member of the U.S. Army's High Altitude Rescue Team in Alaska.

The team conducts a debriefing after every flight, ensuring that lessons learned are incorporated into future operations. **Jason Fortenbacher Photo**

COLUMN

FINAL APPROACH | **INTERVIEWED BY HARALDUR U. DIEGO**

BENÓNÝ ÁSGRÍMSSON | ICELANDIC COAST GUARD PILOT

Árni Sæberg Photos

Iceland does not have a military, but the Icelandic Coast Guard (ICG) is as close as it gets. It is a civilian law enforcement agency that is responsible for search-and-rescue (SAR), maritime safety and security surveillance, and law enforcement in the seas surrounding Iceland. After 50 years of service within the ICG, Benóný Ásgrímsson recently retired from his work as a helicopter captain, with over 12,000 hours in the air, 35,000 cycles and some 15,000 hoist flights. That is what we call a considerable amount.

***Vertical 911:* How did you come to be a helicopter pilot?**

Benóný Ásgrímsson: I started out as a crewman on board one of ICG's ships only 15 years old and worked my way up to be a steersman. By that time, we had already begun using a Bell 47J Ranger for lighthouse maintenance, and my interest was lit. Although I had always envisioned myself being at sea, I had considered the possibilities of going ashore and getting some qualifications to work in land. The opportunity came when the chief offered three of us to come work at the office, if we would attend flight school during the evenings. His vision was to form a special helicopter unit within the ICG, and have us operate it while off duty from the office. It goes without saying that this was long before any flight time regulations appeared. We all took him up on the offer, doing classes after work and flight training on fixed wings during the weekends. After we got our licenses, we flew when our daytime job was over. That was way before anyone invented duty time.

After having used helicopters like the Bell Ranger and a Sikorsky S-62 for several years, the ICG entered a new era in 1980 when TF-RAN, a Sikorsky S-76, entered operation. It was the first civilian twin-engine SAR helicopter in Iceland, and the one Ásgrímsson was trained especially for. It was then his days at sea were over. Well, almost, because he remained as a reserve on the ship.

***V911:* After all those years flying helicopters, what stands out as the most memorable occurrence?**

BA: I think that the fateful accident of TF-RAN in 1983 was the one that stands out. We lost four good men that cold day in November, all of them not only colleagues, but friends of mine. The history of Icelandic helicopter operations had been awful in terms of safety, with nine Icelanders killed in accidents in the preceding eight years, plus numerous accidents where helicopters crashed without fatalities. It got to the point where the Parliament discussed whether operations with helicopters should be limited to the U.S. Navy, who had a base here. Fortunately, it did not come to that, but that accident proved to be a catalyst in regards to flight safety. Better maintenance and improved training of pilots and personnel are attributing factors. Back in the days, you got your license and jumped up in the aircraft and did whatever you wanted to. But thankfully, those days are gone and the safety record has gotten impeccable. We can have different opinions on all the rules and regulations that apply to this field, but I think we can agree that they have worked towards improving safety, like the statistics prove.

Before the private companies came about, we at the ICG did everything we got asked for; transported heads of state, shot sheep up in the mountains, flew cargo, and did all kinds of slinging. Once we got asked if we could rescue five cows that had been trapped inside a narrow canyon. They had been grazing and moved further and further into it until they had eaten all the grass available and were unable to return. They had exhausted themselves trying to escape and the farmers had explored all other options to save them, so the last resort was to try to use the Ecureuil there. There were only a couple of feet between the rotor and the walls of the canyon when I lowered it in to the cows, that lay there motionless because of starvation. We got them into sling nets and hauled them up to the canyon's edge. The moment they saw grass, they stood up and started eating. Looking back, that was the technically hardest rescue mission I ever flew. And probably with the least grateful survivors.

***V911:* Have you ever been scared during missions?**

BA: I think that a certain amount of fear is appropriate in every flight. That assists proper decision making and brings alertness to the crew. But I've been scared on behalf of others. During search-and-rescue missions, it is sometimes necessary to push the envelope of the crew and aircraft to the limits, but the trick is knowing where the limits are [and] being able to stop before you cross the line.

***V911:* Now that you've completed a successful career in aviation, what does a retired SAR captain do these days?**

BA: I was planning on going into retirement full force, but the Icelandic Transport Authority asked me to come in part-time as a contractor to assist with supervision and audits. So now I have more time to spend time for other adventures, whatever they may be. And golfing, of course.

***V911:* What advice would you give a young person thinking about a career in aviation?**

BA: First of all, that person has to take a close look at what possibilities there are out there on the market. It doesn't only take money, but a great deal of commitment and stamina. Even forming a family would have to wait. But if he is realistic in regards of his talent, and has the desire, then I would say go for it!


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